INSTRUCTION MANUAL
FOR
TYPE RS-111-1B-12
RECEIVING SYSTEM

WATKINS-JOHNSON COMPANY
CEI DIVISON
6006 EXECUTIVE BOULEVARD
ROCKVILLE, MARYLAND 20852

3rd Printing
M/200/10/4/71

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ADDENDA

The following changes should be incorporated in the electrical parts list and schematic diagrams for the RS-111-1B-12, where applicable.

Type 7163 490-1000-MC Tuner (A4).

Add C33 0.27 pF, ±10%, 500V QC (.27 pF, K) 95121

Add note "Nominal value, final value factory selected" to C33.

Show C33 wired across CR1.

Type 7233 2-MC Bandwidth IF Amplifier (A7)

Ref. Desig.	From	To	Mfr. Part No.	Mfr. Code
C26	Standoff	Feedthrough	FA5C-102W	Same
E2	Add	Terminal, Insulated	SFU-16	04013
R22	Add	200Ω, 5%, 1/4W	RCR07G201JS	81349
R23	Add	47kΩ, 5%, 1/4W	RCR07G473JS	81349

Show R23 from new E2 on chassis wall to junction of CR1 and A2R2 and A2C3.

Show R22 between C26 and A2Q2 emitter.

Type 8133 IF Amplifier Board No. 2 (A5A2).

Change CR1 through CR4 from 1N198 to 1N4449

Type 8232 Sweep Generator (A5A3).

Ref. Desig.	From	To	Mfr. Part No.	Mfr. Code
R34	680 kΩ	100 kΩ	RCR07G104JS	81349
R35	330 kΩ	100 kΩ	RCR07G104JS	81349

Part 13991 P. C. Board (A5A4A1).

Change C1 and C2 from 47 pF to 51 pF, 5%, 500V, CM04ED510J03, 81349

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Table 1-1. Type RS-111-1B-12 Receiving System, Specifications

Type of Reception	AM, FM, CW
Frequency Range	30-1000 mc in four bands: Band A, 30-60 mc; Band B, 60-300 mc; Band C, 235-500 mc; Band D, 490-1000 mc
Input Impedance	To operate from 50-ohm source
Noise Figure	Band A, 4 db max; Band B, 6.5 db max; Band C, 10 db max; Band D, 12 db max
Image Rejection	Band A, 60 db min; Band B, 50 db min; Band C, 65 db min; Band D, 75 db min
IF Rejection	Band A, 54 db min; Band B, 80 db min; Band C, 80 db min; Band D, 90 db min
Oscillator to Antenna Conduction	Band A, 15 μv max; Band B, 15 μv max from 60-260 mc and 25 μv max from 260-300 mc; Band C, 8 μv max; Band D, 75 μv max
IF Bandwidths	Four total, two operating simultaneously: 2 mc and either 20 kc, 75 kc, or 300 kc selectable from front panel.
Band A and Band B Sensitivity	
20-kc Bandwidth	AM: 1 μv input, modulated 50%, produces 10 db (s plus n)/n min FM: 2 μv input, modulated at 1 kc with 7-kc deviation, produces 21 db (s plus n)/n min
75-kc Bandwidth	AM: 2 μv input, modulated 50%, produces 10 db (s plus n)/n min FM: 3 μv input, modulated at 1 kc with 25-kc deviation, produces 21 db (s plus n)/n min
300-kc Bandwidth	AM: 4 μv input, modulated 50%, produces 11 db (s plus n)/n min FM: 4 μv input, modulated at 1 kc with 100-kc deviation, produces 21 db (s plus n)/n min
2-mc Bandwidth	AM: 11 μv input, modulated 50%, produces 10 db (s plus n)/n min FM: 12 μv input, modulated at 1 kc with 750-kc deviation, produces 21 db (s plus n)/n min
Band C and Band D Sensitivity	
20-kc Bandwidth	AM: 2 μv input, modulated 50%, produces 10 db (s plus n)/n min FM: 4 μv input, modulated at 1 kc with 7-kc deviation, produces 21 db (s plus n)/n min
75-kc Bandwidth	AM: 8 μv input, modulated 50%, produces 17 db (s plus n)/n min FM: 6 μv input, modulated at 1 kc with 25-kc deviation, produces 21 db (s plus n)/n min
300-kc Bandwidth	AM: 8 μv input, modulated 50%, produces 10 db (s plus n)/n min FM: 8 μv input, modulated at 1 kc with 100-kc deviation, produces 21 db (s plus n)/n min
2-mc Bandwidth	AM: 22 μv input, modulated 50%, produces 10 db (s plus n)/n min FM: 24 μv input, modulated at 1 kc with 750-kc deviation, produces 21 db (s plus n)/n min
Band A and Band B Output Stability	
20-kc/75-kc/300-kc Bandwidths	AM: Output varies less than 3 db for input range of 2 to 10,000 μv FM: Output varies less than 2 db for input range of 1.5 to 10,000 μv
2-mc Bandwidth	AM: Output varies less than 4 db for input range of 4 to 10,000 μv FM: Output varies less than 4 db for input range of 4 to 10,000 μv
Band C and Band D Output Stability	
20-kc/75-kc/300-kc Bandwidth	AM: Output varies less than 4 db for input range of 4 to 10,000 μv FM: Output varies less than 2 db for input range of 3 to 10,000 μv
2-mc Bandwidth	AM: Output varies less than 4 db for input range of 8 to 10,000 μv FM: Output varies less than 4 db for input range of 8 to 10,000 μv
Outputs from 20-kc/75-kc/300-kc Bandwidth	
Audio Amplifier Response	Within 3 db from 100 cps to 40 kc
Audio Output Power	0.1 watt, min, into 600-ohm load, balanced or unbalanced
Video Amplifier Response	Within 3 db from 50 cps to 150 kc
Video Output Level	5 volts rms across a 10K unbalanced load
Narrow Band AM Video Output	100 mV, rms across 1 MΩ unbalanced load

Table 1-1. Type RS-111-1B-12 Receiving System, Specifications - (Continued)

Outputs from 2-mc Bandwidth	
FM Video Amplifier Response	Within 3 db from dc to 1 mc
AM Video Amplifier Response	Within 3 db from 30 cps to 1 mc
FM Video Output Level	0.7 volt rms across a 93-ohm load
AM Video Output Level	0.7 volt rms across a 93-ohm load
Fine Tuning	Operates on all bands
Beat Frequency Oscillator	Operates in CW mode on either 20-kc, 75-kc, or 300-kc IF bandwidths
Meter	Signal strength
LO Outputs:	
Band A and Band B	30-300 mc, 50 mv minimum across 50-ohm load.
Band C and Band D	235-1000 mc, 50 mv minimum across 50-ohm load
Frequency Display Section	
Sweep Linearity	Within 5% of sweep width
Sweep Width	Continuously adjustable from 0 to 3 mc
Sensitivity for Full Deflection	2.5 µv input to receiver
Resolution	Using approximately 100-kc sweep width, two signals 20-kc apart will be displayed with at least 6-db valley between the peaks
Power Input	115/230 volts, 50-400 cps
Power Consumption	45 watts, approximately
Weight	35 lbs., approximately
Size	5.25-inches high x 19-inches wide x 15.5 inches deep

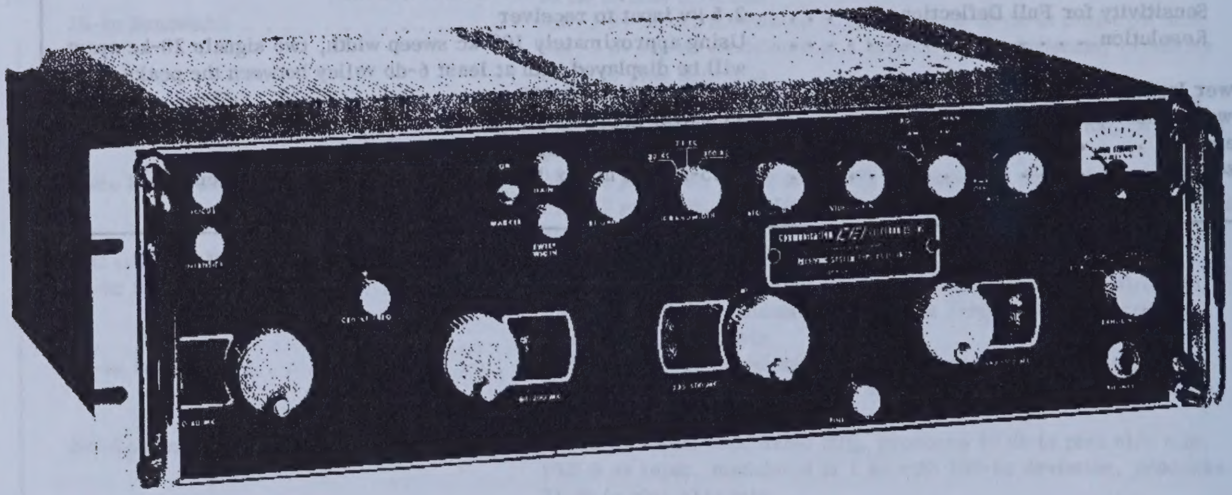


Figure 1-1. Type RS-111-1B-12 Receiving System, Front View

SECTION I

GENERAL DESCRIPTION

1.1 ELECTRICAL DESCRIPTION

The CEI type RS-111-1B-12 Receiving System provides AM, FM and CW reception including a visual spectrum display over the 30 to 1000-mc frequency range in four bands: 30 to 60-mc, 60-300-mc, 235-500-mc, and 490-1000 mc. Two IF bandwidths are in operation at all times. One is a 2-mc bandwidth strip which provides simultanious AM and FM video outputs. The other is either 20 kc, 75 kc or 300 kc, depending on the setting of the front-panel IF BANDWIDTH switch. An AM video, narrow band AM video, or FM video output from this strip is available depending on the setting of the front-panel function switch. The narrow band AM video is the unamplified AM detector output signal. The 20-kc/75-kc/300-kc bandwidth IF strip contains a beat frequency oscillator (BFO) which operates in the CW position of the function switch in all three bandwidths. A single FINE TUNING control provides fine frequency adjustments for the tuner in operation; the switching of the four tuners is controlled by the RANGE switch on the front panel. A visual signal display is provided by a signal monitor which is an integral part of the receiving system. Pertinent specifications for the RS-111-1B-12 are included in Table 1-1.

1.2 MECHANICAL DESCRIPTION

The RS-111-1B-12 Receiving System is packaged in a cabinet which is 5.25 inches high, 19 inches wide ane 15.5 inches deep. The unit weighs approximately 35 pounds and operates from a 115/230 volt, 50-400 cps source; power consumption is approximately 50 watts.

1.2.1 As shown in Figure 1-1 the front panel of the RS-111-1B-12 contains: four tuning dials and knobs; FINE TUNING, AUDIO GAIN, VIDEO GAIN, BFO TUNING, and RF GAIN controls; function, RANGE, and IF BANDWIDTH switches; PHONES jack; and a signal strength meter. These controls, switches and indicators are primarily associated with the receiver functions of the unit. In addition the front panel contains GAIN, SWEEP WIDTH, CENTER FREQ., INTENSITY, and FOCUS controls, as well as a MARKER switch, which are associated with the signal monitor section of the system. The rectangular CRT screen is also installed in the front panel.

1.2.2 The input and output connections are made on the rear apron (see figure 1-2). The audio output is available at terminal strip TB1. The 30-500 MC INPUT J1, 490-1000 MC INPUT J2, 30-300 MC LO OUTPUT A13J3 and 235-1000 MC LO OUTPUT A14J3 are type N connectors. The remaining connectors are BNC-type and are marked as follows: FM VID OUTPUT J3, N B AM VID OUTPUT J17, AM/FM VID OUTPUT J4, and AM VID OUTPUT J5. The ac line fuses are installed on the rear apron along with the 115/230 volt power switch S4.

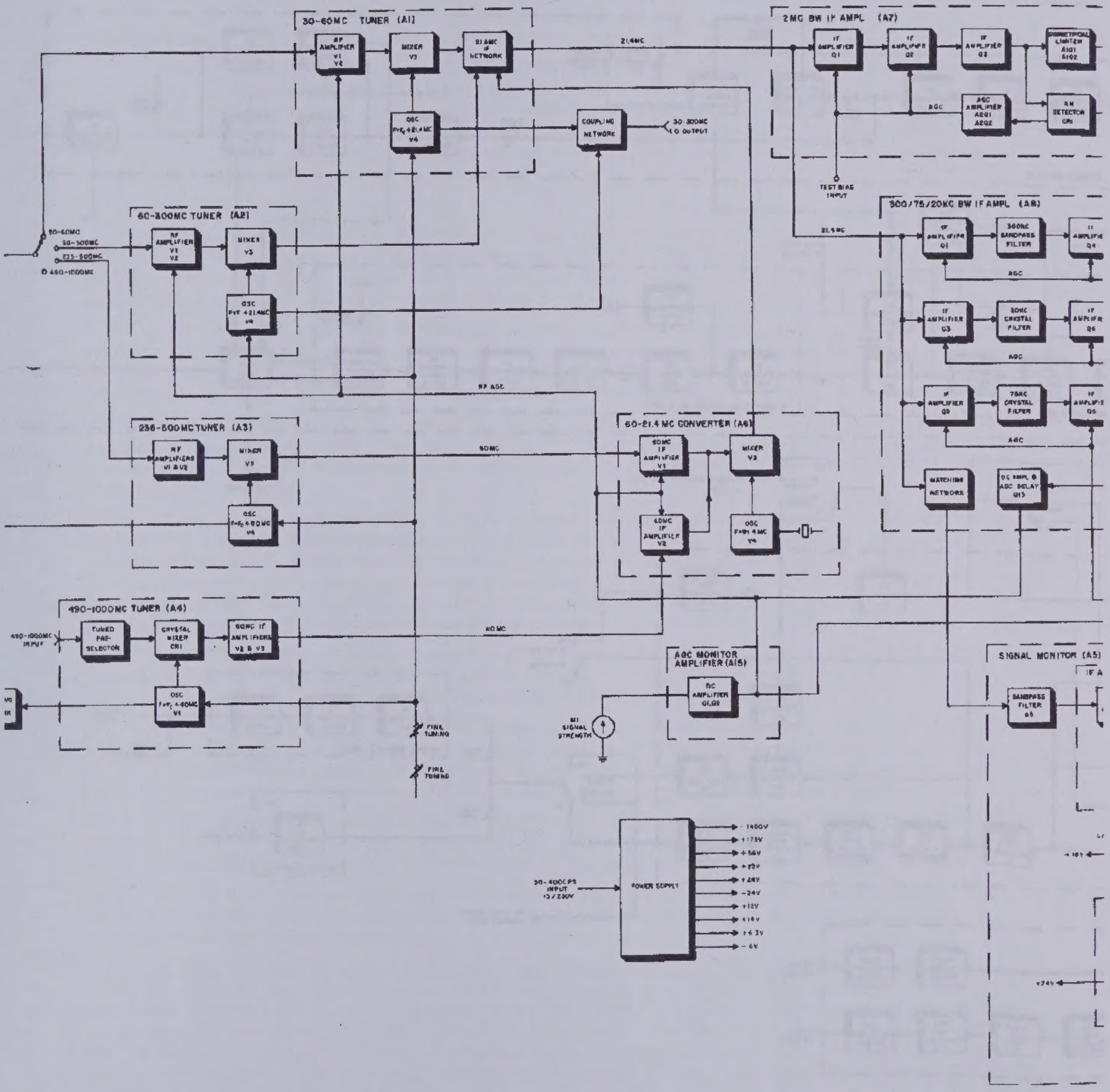
1.2.3 The RS-111-1B-12 contains 15 assemblies. Nine of these (the four tuners, the 60-21.4-mc converter, the 2-mc IF strip, the local oscillator coupling networks and the 20/75/300-kc IF strip) are constructed on silver-plated gold-flashed brass chassis. Five of the assemblies are constructed on etched circuit boards: the video amplifier, audio amplifier, AGC monitor amplifier, and low voltage power supply regulator eteched circuit board assemblies plug into connectors on top of the main-chassis deck while the high voltage power supply regulator board mounts on the inside of the side panel. The fifteenth assembly contains the signal monitor circuitry and is constructed on a brass deck which is mounted above the main chassis. The signal monitor assembly contains the cathode ray tube and five subassemblies. Four of these (IF amplifier boards number 1 and 2, the sweep generator and the bandpass filter) are eteched circuit boards mounted in the signal monitor chassis. The fifth (crystal marker oscillator) is constructed in an aluminum can and mounted on the side of the signal monitor chassis.

Table 1-2. Type RS-111-1B-12 Receving System, Tube and Transistor Complement

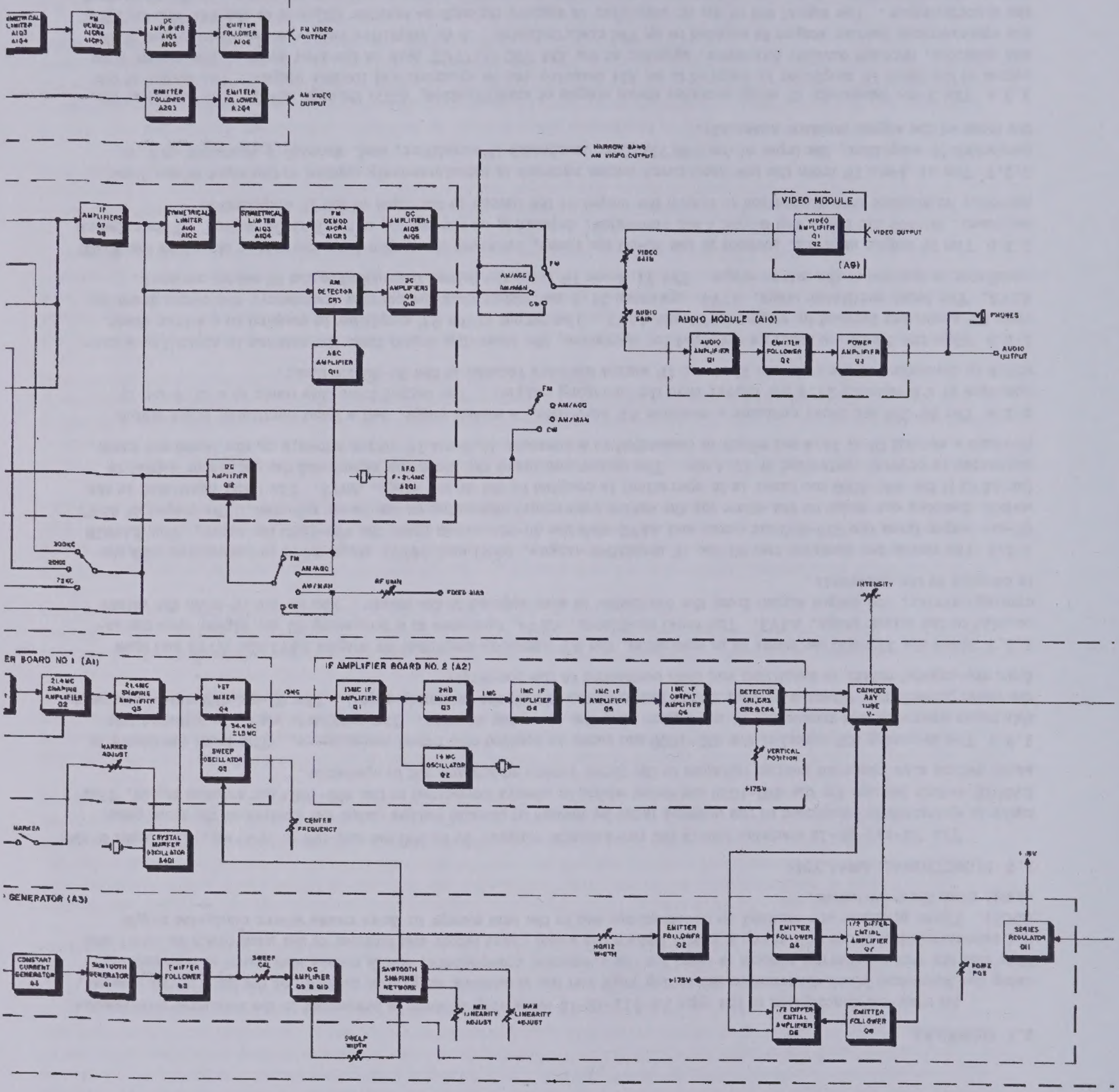
Ref. Desig.	Type	Function	Ref. Desig.	Type	Function
		Main Chassis			Signal Monitor Chassis (Cont.)
Q1	2N1544	Voltage Regulator	A5A3Q9	2N2270	DC Amplifier
			A5A3Q10	2N4037	DC Amplifier
		30-60 mc-Tuner	A5A3Q11	2N2270	Series Regulator
A1V1	6CW4	RF Amplifier	A5A4Q1	2N3933	Crystal Marker Oscillator
A1V2	6CW4	RF Amplifier			
A1V3	7587	Mixer			60-21.4-mc Converter
A1V4	6CW4	Local Oscillator	A6V1	7587	IF Amplifier
			A6V2	7587	IF Amplifier
		60-300-mc Tuner	A6V3	7587	Mixer
2V1	8058	RF Amplifier	A6V4	6CW4	Local Oscillator
A2V2	8058	RF Amplifier			
A2V3	7587	Mixer			2-mc Bandwidth IF Amplifier
A2V4	6CW4	Local Oscillator	A7Q1	2N2708	IF Amplifier
			A7Q2	2N2708	IF Amplifier
		235-500-mc Tuner	A7Q3	2N2708	IF Amplifier
A3V1	7077	RF Amplifier	A7A1Q1	2N706	First Limiter
A3V2	7077	RF Amplifier	A7A1Q2	2N706	First Limiter
A3V3	7587	Mixer	A7A1Q3	2N706	Second Limiter
A3V4	7486	Local Oscillator	A7A1Q4	2N706	Second Limiter
			A7A1Q5	2N2270	DC Amplifier
		490-1000-mc Tuner	A7A1Q6	2N2270	DC Amplifier
A4V1	7486	Local Oscillator	A7A1Q7	2N2270	Emitter Follower
A4V2	6CW4	IF Amplifier	A7A2Q1	2N2270	AGC Amplifier
A4V3	6CW4	IF Amplifier	A7A2Q2	2N2270	AGC Amplifier
			A7A2Q3	2N2270	Emitter Follower
		Signal Monitor Chassis	A7A2Q4	2N2270	Emitter Follower
A5V1	3ASP1	CRT	A7A2Q5	2N2270	Emitter Follower
A5A1Q1	2N3933	Shaping Amplifier			
A5A1Q2	2N3933	Shaping Amplifier			20/75/300-kc Bandwidth IF Amplifier
A5A1Q3	2N3933	Shaping Amplifier	A8Q1	2N2708	300-kc BW IF Amp
A5A1Q4	3N128	First Mixer	A8Q2	2N2708	75-kc BW IF Amp
A5A1Q5	2N3933	Sweep Oscillator	A8Q3	2N2709	20-kc BW IF Amp
A5A2Q1	2N3933	13-mc IF Amplifier	A8Q4	2N2708	300-kc BW IF Amp
A5A2Q2	2N3933	14-mc Oscillator	A8Q5	2N2708	75-kc BW IF Amp
A5A2Q3	2N3933	Second Mixer	A8Q6	2N2708	20-kc BW IF Amp
A5A2Q4	2N3933	1-mc IF Amplifier	A8Q7	2N2708	IF Amplifier
A5A2Q5	2N3933	1-mc IF Amplifier	A8Q8	2N2708	IF Amplifier
A5A2Q6	2N3933	1-mc Output Amplifier	A8Q9	2N697	Emitter Follower
A5A3Q1	2N2646	Sawtooth Generator	A8Q10	2N697	Emitter Follower
A5A3Q2	2N2270	Emitter Follower	A8Q11	2N697	AGC Amplifier
A5A3Q3	2N4037	Constant Current Generator	A8Q12	2N697	DC Amplifier
A5A3Q4	2N2270	Emitter Follower	A8Q13	2N1131	AGC Regulator
A5A3Q5	2N2270	Emitter Follower	A8A1Q1	2N706	First Limiter
A5A3Q6	2N3440	Differential Amplifier	A8A1Q2	2N706	First Limiter
A5A3Q7	2N3440	Differential Amplifier	A8A1Q3	2N706	Second Limiter
A5A3Q8	2N2270	Emitter Follower	A8A1Q4	2N706	Second Limiter

Table 1-2. Type RS-111-1B-12 Receiving System, Tube and Transistor Complement (Cont.)

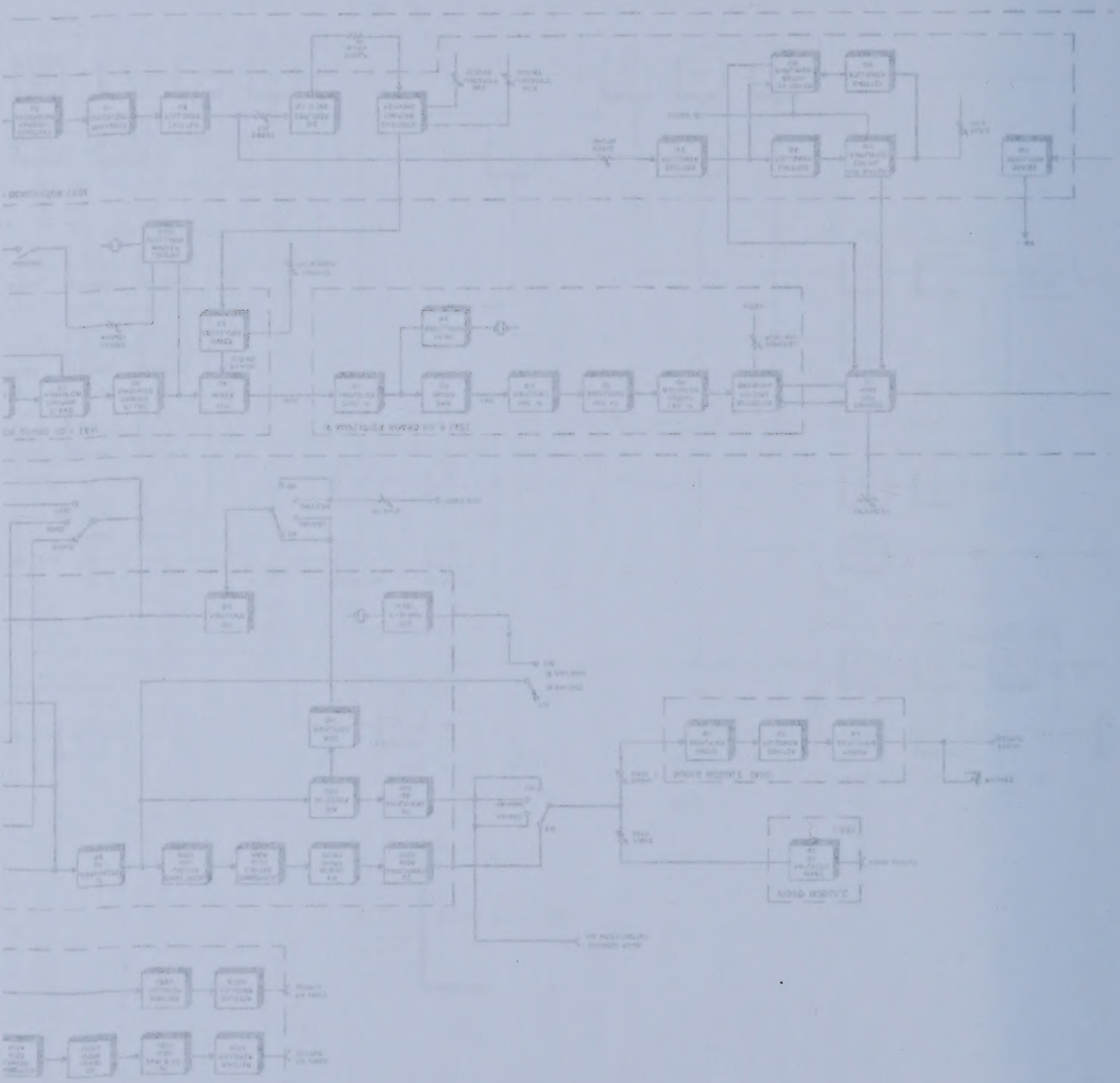
Ref. Desig.	Type	Function	Ref. Desig.	Type	Function
20/75/300-kc Bandwidth IF Amplifier (Cont.)			CRT Power Supply Regulator		
A8A1Q5	2N697	Emitter Follower	A11V1	GV3A-1200	Voltage Regulator
A8A1Q6	2N697	Emitter Follower			
A8A2Q1	2N706	BFO	General Power Supply Regulator		
			A12Q1	2N2270	Voltage Regulator
Video Amplifier			A12Q2	2N1038	Voltage Regulator
A9Q1	2N697	Video Amplifier	A12Q3	2N2270	Voltage Regulator
A9Q2	2N526	Video Amplifier	A12Q4	2N2270	Voltage Regulator
			A12Q5	2N2270	Voltage Regulator
Audio Amplifier					
A10Q1	2N335	Audio Amplifier	AGC Monitor Amp		
A10Q2	2N335	Driver	A15Q1	2N929	DC Amplifier
A10Q3	2N2270	Power Amplifier	A15Q2	2N3251	DC Amplifier


30-60MC TUNER (A1)
RF AMPLIFIER V1 V2
MIXER V3
21.4MC IF NETWORK
OSC F=F$_c$+21.4MC V4
COUPLING NETWORK
30-300MC LO OUTPUT
21.4MC
2MC BW IF AMPL (A7)
IF AMPLIFIER Q1
IF AMPLIFIER Q2
IF AMPLIFIER Q3
SYMMETRICAL LIMITER A1Q1 A1Q2
AGC AMPLIFIER A2Q1 A2Q2
AM DETECTOR CR1
AGC
TEST BIAS INPUT
30-60MC
60-300MC
235-500MC
490-1000MC
60-300MC TUNER (A2)
RF AMPLIFIER V1 V2
MIXER V3
OSC F=F +21.4MC V4
21.4MC
300/75/20KC BW IF AMPL (A8)
IF AMPLIFIER Q1
300KC BANDPASS FILTER
IF AMPLIFIER Q4
AGC
IF AMPLIFIER Q3
20KC CRYSTAL FILTER
IF AMPLIFIER Q6
AGC
IF AMPLIFIER Q2
75KC CRYSTAL FILTER
IF AMPLIFIER Q5
AGC
MATCHING NETWORK
DC AMPL & AGC DELAY Q13
RF AGC
235-500MC TUNER (A3)
RF AMPLIFIERS V1 & V2
MIXER V3
OSC F=F$_c$+60MC V4
60MC
60-21.4 MC CONVERTER (A6)
60MC IF AMPLIFIER V1
MIXER V3
60MC IF AMPLIFIER V2
OSC F=81.4MC V4
490-1000MC TUNER (A4)
490-1000MC INPUT
TUNED PRE-SELECTOR
CRYSTAL MIXER CR1
60MC IF AMPLIFIERS V2 & V3
OSC F=F$_c$+60MC V1
60MC
FINE TUNING
FINE TUNING
AGC MONITOR AMPLIFIER (A15)
DC AMPLIFIER Q1,Q2
M1 SIGNAL STRENGTH
SIGNAL MONITOR (A5)
IF A
BANDPASS FILTER
50-400CPS INPUT 115/230V
POWER SUPPLY
-1400V
+175V
+56V
+23V
+24V
-24V
+12V
+18V
+6.3V
-6V
+18V
+24V

Type RS-111-1B-12 Receiving System,
Functional Block Diagram



SYMMETRICAL LIMITER A1Q3 A1Q4
FM DEMOD A1CR4 A1CR5
DC AMPLIFIER A1Q5 A1Q6
EMITTER FOLLOWER A1Q6
FM VIDEO OUTPUT
EMITTER FOLLOWER A2Q3
EMITTER FOLLOWER A2Q4
AM VIDEO OUTPUT
NARROW BAND AM VIDEO OUTPUT
IF AMPLIFIERS Q7 Q8
SYMMETRICAL LIMITER A1Q1 A1Q2
SYMMETRICAL LIMITER A1Q3 A1Q4
FM DEMOD A1CR4 A1CR5
DC AMPLIFIERS A1Q5 A1Q6
AM DETECTOR CR3
DC AMPLIFIERS Q9 Q10
AGC AMPLIFIER Q11
FM
AM/AGC
AM/MAN
CW
VIDEO GAIN
AUDIO GAIN
VIDEO MODULE
VIDEO AMPLIFIER Q1 Q2
VIDEO OUTPUT
(A9)
AUDIO MODULE (A10)
AUDIO AMPLIFIER Q1
EMITTER FOLLOWER Q2
POWER AMPLIFIER Q3
PHONES
AUDIO OUTPUT
DC AMPLIFIER Q12
BFO F=21.4MC A3Q1
300KC
20KC
7.2KC
RF GAIN
FIXED BIAS
INTENSITY
ER BOARD NO 1 (A1)
21.4MC SHAPING AMPLIFIER Q2
21.4MC SHAPING AMPLIFIER Q3
1ST MIXER Q4
34.4MC ±1.5MC
SWEEP OSCILLATOR Q5
MARKER ADJUST
MARKER
CRYSTAL MARKER OSCILLATOR A4Q1
CENTER FREQUENCY
IF AMPLIFIER BOARD NO. 2 (A2)
13MC
13MC IF AMPLIFIER Q1
2ND MIXER Q3
1MC
14MC OSCILLATOR Q2
1MC IF AMPLIFIER Q4
1MC IF AMPLIFIER Q5
1MC IF OUTPUT AMPLIFIER Q6
DETECTOR CR1,CR3 CR2&CR4
CATHODE RAY TUBE V1
VERTICAL POSITION
+175V
GENERATOR (A3)
CONSTANT CURRENT GENERATOR Q5
SAWTOOTH GENERATOR Q1
EMITTER FOLLOWER Q2
SWEEP CAL
DC AMPLIFIER Q9 & Q10
SAWTOOTH SHAPING NETWORK
MIN LINEARITY ADJUST
MAX LINEARITY ADJUST
SWEEP WIDTH
HORIZ WIDTH
EMITTER FOLLOWER Q2
EMITTER FOLLOWER Q4
1/2 DIFFERENTIAL AMPLIFIER Q7
+175V
1/2 DIFFERENTIAL AMPLIFIER Q6
EMITTER FOLLOWER Q8
HORIZ POS
SERIES REGULATOR Q11
+18V



SECTION II

CIRCUIT DESCRIPTION

2.1 GENERAL

An over-all description of the type RS-111-1B-12 Receiving System is presented in the following paragraphs using the functional block diagram on the facing page and the schematic diagrams included at the back of the manual. Note that the unit numbering system is used for the electrical components, which means that parts on assemblies and subassemblies of the unit carry a prefix before the usual class letter and number of the item (such as A1R1 and A3C5). These prefixes are omitted on illustrations and in the text except in those cases where confusion might result from their omission.

2.2 FUNCTIONAL ANALYSIS

The RS-111-1B-12 contains inputs for two antenna ranges: 30 to 500 mc and 490 to 1000 mc. The input to the tuner in operation is connected to the antenna input by means of coaxial relays under the control of the front panel RANGE switch (except for the 490-1000 mc tuner which is always connected to the 490-1000 mc antenna input). This same switch also removes source voltages to the three tuners which are not in operation.

2.2.1 The incoming RF signal to the 490-1000 mc tuner is applied to a tuned preselector. The local oscillator in this tuner operates at a frequency 60 mc higher than the incoming carrier. The oscillator signal is injected into the tuned preselector where a crystal mixer heterodynes it with the incoming signal. The 60-mc difference frequency from the crystal mixer is amplified and then connected to the converter.

2.2.2 When the 235-500 mc tuner is in operation, the RF signal is amplified by stages A3V1 and A3V2 and then coupled to the mixer stage, A3V3. The local oscillator, A3V4, operates at a frequency 60 mc higher than the incoming carrier; the output signal from the oscillator is also applied to the mixer. The 60-mc IF from the mixer is coupled to the converter.

2.2.3 The converter contains two 60-mc IF amplifier stages, A6V1 and A6V2; stage A6V1 is associated with the 60-mc output from the 235-500 mc tuner and A6V2 with the 60-mc output from the 490-1000 mc tuner. The RANGE switch disables one stage or the other (or the entire converter) depending on the tuner selected. The output of A6V1 (or A6V2 if the 490-1000 mc tuner is in operation) is coupled to the mixer stage, A6V3. The local oscillator in the converter is crystal controlled at 81.4 mc. The mixer combines the incoming signal and the oscillator signal to produce a second IF at 21.4 mc which is connected to a common 21.4-mc IF output network on the 30-60 mc tuner.

2.2.4 The 60-300 mc tuner contains a cascode RF amplifier, a mixer stage, and a local oscillator stage which operates at a frequency 21.4 mc higher than the incoming carrier. The output from this tuner is a 21.4-mc IF which is connected to the common 21.4-mc IF output network located in the 30-60 mc tuner.

2.2.5 When the 30-60 mc tuner is selected for operation, the incoming signal from the antenna is applied to a cascode RF amplifier formed by stages A1V1 and A1V2. The output of the RF amplifier is coupled to a mixer stage, A1V3. The local oscillator stage, A1V4, operates 21.4 mc higher than the carrier frequency; the output from the oscillator is applied to the mixer stage. The 21.4-mc IF from the mixer is coupled to the IF output network.

2.2.6 The IF output network, located in the 30-60 mc tuner, receives the output from the mixer stages in the 30-60 mc tuner, 60-300 mc tuner and 60-21.4 mc converter, depending on the setting of the RANGE switch. This network provides impedance transformation to match the output of the tuners to the input of the IF amplifiers.

2.2.7 The 21.4-mc IF from the low band tuner output network is simultaneously applied to the input of the 2-mc bandwidth IF amplifier, the input of the 300/75/20-kc bandwidth IF amplifier, and, through a resistive pad, to the input of the signal monitor assembly.

2.2.8 The 2-mc bandwidth IF strip contains three stages of amplification, A7Q1 through A7Q3. The signal at the output of the third IF amplifier is coupled to an AM detector and to symmetrical limiter stages. The output of the AM detector, through emitter followers, appears at the AM VID OUTPUT jack on the rear apron. The output from the symmetrical limiter stages is applied to an FM discriminator. A dc amplifier receives the video output from the discriminator. The signal out of the dc amplifier is applied through an emitter follower to the FM VID OUTPUT jack on the rear apron. A two-stage AGC amplifier within the strip provides a gain control voltage which is applied to the first and second IF amplifier stages.

2.2.9 The 300/75/20-kc bandwidth IF strip contains three paths through which the signal can be conducted to subsequent stages in the unit. All three paths are similar, each containing two IF amplifiers separated by bandpass filters. The circuits in two paths are disabled by the IF BANDWIDTH switch while the circuits in the third path are activated, depending on whether this switch is placed in the 300 KC, 75 KC or 20 KC position. The bandpass filter in the 300-kc bandwidth path is a conventional LC circuit while crystal filters are used in the 75 kc and 20 kc paths. The signal out of the path in operation receives additional amplification in stages A8Q7 and A8Q8 before application to the limiters and the AM detector. From the detector, the AM video signal is connected to an AGC amplifier (A8Q11 and A8Q12) and to a dc amplifier (A8Q9 and A8Q10). The video signal out of the dc amplifier is applied through the function switch to the video amplifier module. The voltage at the output of the AGC amplifier is used to control the gain of several stages in the receiver when the function switch is in the FM or AM/AGC positions.

2.2.10 The output of the symmetrical limiter stages in the 300/75/20-kc bandwidth IF strip is applied to an FM discriminator circuit which includes A8A1CR4 and A8A1CR5. The output of the discriminator is amplified and applied to an emitter follower. The FM video signal from the emitter follower is connected to the FM position on the function switch. The AM video signal from this IF strip is connected to the AM/AGC, AM/MAN, and CW positions of the function switch. Thus, the signal at the arm of the function switch is either the FM video output or the AM video output as determined by the switch setting.

2.2.11 The video signal from the arm of the function switch is applied through the VIDEO and AUDIO gain controls to the video and audio amplifiers, respectively. The output from the video amplifiers (A9Q1 and A9Q2) appears at the AM-FM VID OUTPUT jack on the rear apron. A narrow band AM video signal is taken directly from the function switch and fed through isolation resistor R16 to jack J17 on the rear apron.

2.2.12 The audio amplifier receives its input through the AUDIO GAIN control. The module contains an amplifier (A10Q1), emitter follower (A10Q2) and a power amplifier (A10Q3). The audio output from the module is available at the PHONES jack on the front panel and at the terminal strip on the rear apron.

2.2.13 The local oscillator output of the four tuners is connected to one of two coupling networks. One network couples the outputs of the 30-60 mc tuner local oscillator and the 60-300 mc tuner local oscillator to a rear-apron jack marked 30-300 MC LO OUTPUT. The outputs of the oscillators in the remaining two tuners are similarly coupled through a second coupling network to the 235-1000 MC LO OUTPUT jack.

2.2.14 The front-panel FINE TUNING and BFO TUNING controls are used to vary the frequency of the local oscillator in operation. The BFO stage (A8A2Q1) is crystal controlled at 21.4. The BFO is activated when the function switch is placed in the CW position; the 21.4 mc output of the BFO is injected into the AM detector in the multiple-bandwidth IF strip. Since the BFO is crystal controlled, it is necessary to vary the frequency of the local oscillator in the tuner in operation in order to vary the pitch of the CW-audio signal.

2.2.15 The signal monitor assembly contains the cathode ray tube (CRT),a bandpass filter, the sweep generator, IF amplifiers, and crystal oscillator subassemblies. The sawtooth generator section provides the waveform which is used to control both the horizontal deflection on the CRT and the frequency excursions of the sweep oscillator. The fact that this single waveform controls the action in both of these circuits explains how synchronization is obtained between the various signals in the incoming RF spectrum and their position on the CRT trace.

2.2.16 The input to the signal monitor is coupled through bandpass filter assembly A5. This filter has a flat bandpass of 3 mc centered on 21.4 mc. It aids in the rejection of image frequency signals and also reduces feed-through of 13-mc signals, the signal monitors first IF.

2.2.17 The signal from the filter is amplified by three shaping amplifiers A1Q1, A1Q2 and A1Q3, and then applied to the first mixer A1Q4. The shaping amplifiers provide an over-coupled frequency response which is essentially flat over a 3-mc bandwidth centered at 21.4 mc when combined with the peaked mixer response of the associated tuner. Gain of the first two shaping amplifiers is set by the front-panel gain control. The signal from the shaping amplifiers is combined with the sweep oscillator signal in the first mixer A1Q4.

2.2.18 The sweep oscillator A1Q5 operates on a center frequency of 34.4 mc. This signal combines with the 21.4-mc input to produce a 13-mc IF at the output of the first mixer A1Q4. The tuned circuits following the mixer reject all frequencies except for a narrow band centered at 13 mc. A sawtooth waveform from sweep generator module A3 is applied to a Varicap frequency modulator in the sweep oscillator circuit. This sawtooth waveform causes the sweep oscillator to vary above and below its center frequency. The Sweep Rate Calibrate control determines the rate at which the oscillator is swept across its frequency range. The front-panel SWEEP WIDTH control determines the deviation from center frequency. With this control at its maximum sweep width setting, 3 mc, the sweep oscillator varies ±1.5 mc about its 34.4-mc center frequency. This sweep width provides complete coverage of the 3-mc input band. As the oscillator is swept across this frequency range it hetrodynes with the input signal in the first mixer. When an input signal is 13 mc below the sweep oscillator frequency, an output is produced which is equal to the difference between the input and the sweep oscillator frequencies. For example a signal at the high frequency end of the input band, 22.9 mc, will beat with the sweep oscillator signal and produce a 13-mc output when the sweep oscillator frequency is 35.9 mc. When the sweep oscillator frequency is 32.9 mc, an input signal at 19.9 mc will produce an output. Since the horizontal movement of the trace on the CRT is controlled by the same sawtooth waveform that controls the sweep oscillator, the signals out of the first mixer ultimately appear as vertical pips on the face of the tube which correspond to their original position in the input spectrum.

2.2.19 The sawtooth waveform originates in the sweep generator module A3. The sawtooth generator, A3Q1, produces a waveform which may be set to any frequency between 5 cps and 25 cps by the sweep rate cal potentiometer. This control is factory adjusted to set the sweep rate at approximately 20 cps. It is used to adjust the output voltage of constant current generator A3Q3 which supplies the sawtooth generator A3Q1. The sawtooth waveform from A3Q1 is coupled through emitter follower A3Q5 to both dc amplifiers A3Q9 and A3Q10 which ultimately drive the sweep oscillator, and to the horizontal amplifier section. The signal from emitter follower A3Q5 is fed through the sweep calibrate potentiometer, a dc amplifier made up of transistors A3Q7 and A3Q8, the SWEEP WIDTH potentiometer, and the sawtooth shaping network to the sweep oscillator A1Q5.

2.2.20 The sawtooth shaping network modifies the sawtooth waveform to compensate for the nonlinear relation between the voltage applied to the Varicap modulator in the sweep oscillator and the output frequency of the sweep oscillator. Shaping is necessary to obtain a linear frequency display on the CRT over the entire 3-mc bandwidth.

2.2.21 The sawtooth waveform produced by A3Q1 is also used to drive the horizontal deflection plates on the CRT. The horizontal deflection voltage is taken from the output of A3Q5 and is coupled through the horizontal width control and emitter follower A3Q2 to a differential amplifier consisting of A3Q6 and A3Q7. Emitter follower stages A3Q4 and A3Q8 provide ac and dc coupling, respectively, between the two differential stages. The use of a 175V supply and high voltage transistors A3Q6 and A3Q7 permits direct drive of the horizontal deflection plates in the CRT without a step-up transformer. The horizontal position control permits the entire trace to be moved to the left or right.

2.2.22 The 13-mc IF signal from the first mixer is fed through IF amplifier A2Q1 and applied to the second mixer A2Q3. The output of the crystal-controlled 14-mc oscillator A2Q2 is also applied to the second mixer. The 1 mc difference frequency at the output of the mixer is fed to IF amplifiers A2Q4 and A2Q5 before being applied to the 1-mc output amplifier A2Q6. This stage drives push-pull voltage doubling detectors A2CR1 through A2CR4. The output from the detectors consists of two equal signals of opposite polarity which are applied to opposing vertical deflection plates in the cathode ray tube.

2.2.23 The gain of the signal monitor is controlled by the front panel GAIN control which varies the bias on the bases of the first two 21.4-mc shaping amplifiers. Controlling the gain of these stages sets the amplitude of the signal pips on the screen of the CRT. The vertical center control, which functions in conjunction with the push-pull detector circuit and 175V positioning voltage, adjusts the vertical position of the trace on the CRT. The MARKER switch activates the 21.4-mc marker oscillator, A4, and results in a pip on the CRT screen which represents the center of the signal monitor response. This aids in tuning and in determining the frequency of incoming signals. The marker adjust potentiometer sets the amplitude of the marker pip. The center frequency control varies the bias level on the Varicap modulator to provide vernier control of the sweep oscillator center frequency.

2.2.24 High voltage for the signal monitor is provided by Power Supply Regulator (CRT). This power supply also provides a 175V output which is applied to the collectors of horizontal amplifiers A3Q6 and A3Q7, and to the vertical deflection circuit for use in positioning the trace vertically. A +48V output from this module supplies sweep amplifiers A3Q9 and A3Q10. The remaining voltages required for operation of the signal monitor are supplied by the receivers Power Supply Regulator (GEN). Both are designed to operate from primary power source of 115/230 Vac, 60 cps.

2.3 30-60 MC RF TUNER

The type 7165 tuner covers the 30 to 60 mc range. The tuner schemtic is shown in Figure 6-1; the reference designation prefix is A1.

2.3.1 RF Amplifier. -The RF amplifier consists of two type 6CW4 Nuvistor triodes V1,and V2, in cascode amplifier configuration. Input tuning is accomplished by inductor L2A, one section of a four-section inductuner, in the grid circuit of V1. Output tuning is accomplished by inductor L2B, another inductuner section in the plate circuit of V2. Neutralization is achieved by feeding a small out-of-phase signal from the plate to the grid of V1 through broadband transformer T1. To extend the dynamic range of the receiver, the RF amplifier signal handling capability is improved by applying a delayed gain control voltage derived in the multiple-bandwidth IF strip and fed to the grid of V1 through resistors R2 and R3.

2.3.2 Local Oscillator. -The local oscillator is a type 6CW4 Nuvistor triode, V4, operated in a Colpitts configuration with the plate at RF ground. The tank circuit is tuned by inductor L2D, a section of the inductuner. The frequency of operation is maintained 21.4-mc above the carrier. The output of the oscillator is coupled to the grid of the mixer through capacitor C18 and to the LO output jack through capacitor C44.

2.3.3 Mixer. -The mixer, V3, is a type 7587 Nuvistor tetrode with its input circuit tuned by inductuner section L2C. Both the signal from the RF amplifier and the output of the local oscillator are applied to its grid, and the two signals are mixed to produce a 21.4-mc IF. Test point TP1, decoupled from the grid, can be used to check oscillator jection and also to check RF alignment by means of an oscilloscope. The mixer output is a plate circuit pi-network formed by capacitor C22 as one leg, the variable inductor L5, and the mixer plate capacitances plus cable capacitance as the other leg. This network also serves as the mixer output network for the 60-21.4 mc converter mixer and the 60-300 mc tuner mixer. The common output to the IF strip is taken through blocking capacitor C24 and jack J3.

2.4 60-300 MC RF TUNER

The type 7164 tuner covers the frequency range of 60 to 300 mc. It contains an RF amplifier, mixer, and local oscillator stage. A schematic diagram of the tuner is included as Figure 6-2; prefix the parts in this assembly with A2.

2.4.1 RF Amplifier. - The tuner employs type 8058 Nuvistor triodes, V1 and V2, in a cascode configuration as the RF amplifier. The input to the tuner is applied through jack J1. The input is tuned by inductor L1A, one section of a four-section inductuner. The amplifier is neutralized by the use of a bridge arrangement which balances the plate-to-grid capacitance of V1. The arms of the bridge are: capacitor C3, the combination of capacitors C4 and C5, the input capacitance of V1, and the plate-to-grid capacitance of V1. The gain of the RF amplifier is varied by a delayed gain control voltage which is derived in the multiple-bandwidth IF strip and applied to the stage through resistor R3.

2.4.2 Local Oscillator. - The local oscillator stage, V4, employs a type 6CW4 Nuvistor triode in a Colpitts configuration. It is tuned by L1D, a section of the inductuner, and maintained at a frequency 21.4-mc higher than the incoming RF carrier. Tank circuit capacitors C25 and C26 have a negative temperature coefficient to compensate r frequency drift due to ambient temperature change. The output from the oscilliator is coupled through capacitor C20 to the mixer control grid circuit, and from the divider formed by capacitors C22 and C42 to the LO output.

2.4.3 Mixer. - The mixer stage, V3, utilizes a type 7587 Nuvistor tetrode. The interstage coupling network between the RF amplifier second stage and the mixer input is tuned by inductors L1B and L1C, two sections of the inductuner. The mixer stage heterodynes the incoming RF signal and the local oscillator signal to produce a 21.4-mc IF signal in the plate circuit. The 21.4-mc signal in the plate circuit is coupled through blocking capacitor C39 and jack J2 to the common IF output network located in the 30-60 mc tuner.

2.5 235-500 MC RF TUNER

The operation of the type 7162 tuner is explained in the following paragraphs. Refer to the schematic diagram, Figure 6-3 and note that the reference designation prefix for this subassembly is A3.

2.5.1 RF Amplifier. - The RF Amplifier consists of two type 7077 ceramic triodes, V1 and V2, both in grounded-grid configuration. The nominal input impedance at jack J1 is 50 ohms. The input circuit is a pi-network matching the antenna to the input of the first stage, V1. Interstage coupling and coupling from the second stage to the mixer is by means of double-tuned circuits. Tuning within the RF amplifier is by inductors L3A, L3B, L3C, L3D, and L3E, five sections of a six-section inductuner. An improvement in stability is obtained by returning the cathode of V1 and V2 to a -6.3 volt regulated source through resistors R1 and R3.

2.5.2 Local Oscillator. - The local oscillator, V4, is a type 7486 ceramic triode operated in a Colpitts configuration. The tank circuit is tuned by inductor L3F, a section of the inductuner. The operating frequency is maintained 60 mc above the carrier. Increased frequency stabilization is obtained by the use of a regulated -6.3 volt filament supply. The oscillator's signal is coupled to the low band tuner mixer through capacitor C28. Fine tuning and BFO pitch control are accomplished by a voltage-variable capacitor, CR1, which varies the capacitance of the tank circuit. A voltage-variable capacitor is a semi-conductor device whose effective capacitance varies with the voltage across it. The capacitance of CR1 is controlled by a dc voltage applied through resistors R13 and R15. The level of this voltage is controlled by the FINE TUNING potentiometer and the BFO TUNING potentiometer.

2.5.3 Mixer. - The mixer, V3, is a type 7587 Nuvistor tetrode with its input circuit tuned by inductuner section L3E. Both the signal from the RF amplifier and the output of the local oscillator are applied to its grid and the two signals are mixed to produce a 60-mc IF. An oscilloscope can be connected at test point TP1 in the mixer grid circuit to check oscillator injection and also to check the RF response. The mixer output is taken from the tuner and applied to the converter through a double-tuned coupling whose primary is inductor L14 and whose secondary is inductor A6L1 in the converter. Capacitor A6C1 establishes the degree of coupling between L14 and A6L1.

2.6 490-1000 MC RF TUNER

The type 7163 tuner consists of a preselector, local oscillator, mixer, and two IF amplifiers. The reference designation prefix is A4; a schematic diagram of the tuner is presented in Figure 6-4.

2.6.1 Quadruple-Tuned Preselector. - The RF input circuit in the 490-1000 mc tuner presents an impedance designed for a 50-ohm antenna. The signal is coupled from the input to the quadruple-tuned preselector. Tuning is accomplished by four tuned cavities. The signal passes from cavity to cavity through coupling irises. The cavities are resonated to the carrier frequency by changing the capacitance between the inner conductor and ground. This action effectively produces quarter-wave tuning and is analagous to coaxial-line cavity tuning in which the resonant frequency is determined by the position of the plunger. From the fourth cavity, inductor L6 couples the signal to the crystal mixer.

2.6.2 Local Oscillator. - The local oscillator, V1, is a type 7586 ceramic triode operated as a modified Colpitts oscillator. The tank circuit is a length of transmission line. Capacitor C1E, ganged with the high band tuning control, loads the transmission line so as to make its effective length one-half wavelength at the desired frequency. The oscillator is operated at a frequency 60 mc above the carrier. Increased frequency stabilization is obtained by the use of a regulated -6.3 vdc filiament supply. Fine tuning and BFO pitch control are accomplished by the use of a voltage-variable capacitor, CR2, in the same manner used for fine tuning of the other three tuners (see paragraph 2.5.2). The oscillator signal to the crystal mixer is picked up by the inductor L6 whose lower end reaches through a shield into the chamber where the oscillator stage is mounted.

2.6.3 Crystal Mixer. - The mixer, CR1, is a type 1N82A crystal diode. It receives both the incoming carrier and the oscillator injection signal through inductor L6. Jack J4 is present to facilitate checking the oscillator injection level. The mixer output, a 60-mc IF signal, is applied to the 60-mc IF low-noise amplifier within the tuner.

2.6.4 60-mc IF Amplifier. - To compensate for the lack of gain in the quadruple-tuned preselector, the high band tuner has a 60-mc IF amplifier consisting of two type 6CW4 triodes, V2 and V3, in cascode configuration. Coupling from the mixer is through inductors L13, L15, and capacitor C21. The first stage is neutralized by inductor L16. The output from the amplifier is through a double-tuned circuit, the primary of which is inductor L17 and the secondary of which is inductor A6L2 located in the 60-21.4 mc converter. Capacitor A6C2 fixes the degree of coupling between L17 and A6L2.

2.7 60-TO 21.4-MC CONVERTER

The type 7120 converter contains 60-mc IF buffer amplifiers, a mixer, and an 81.4-mc crystal-controlled oscillator. As shown on the schematic diagram (Figure 6-11) of the converter, A6 is used as the reference designation prefix.

2.7.1 60-mc IF Amplifiers. - The converter uses type 7587 Nuvistor tetrodes (V1 and V2) to amplify the incoming

60-mc signal from the 235-500 mc tuner or the 490-1000 mc tuner. V1 operates in conjunction with the 235-500 mc tuner and V2 with the 490-1000 mc tuner. As the RANGE control switches the source voltages to the tuners, it also switches B-plus to these two stages in the converter. Plate voltage for V3 and V4 is supplied through CR1 or CR2, one of which is forward biased by the voltage applied to C8 or C11. The output from the stage in operation is applied through a double-tuned coupling (L3 and L4) to the grid circuit of the mixer stage.

2.7.2 81.4-mc Oscillator. - The oscillator in the converter, V4, is a type 6CW4 Nuvistor triode. It is crystal controlled and operates at 81.4 mc.

2.7.3 Mixer and IF Output Network. - The mixer stage employs a type 7587 Nuvistor tetrode. The 81.4 mc output from the oscillator is coupled to the control grid of the mixer through capacitor C21. The mixer heterodynes this signal with the 60-mc incoming IF signal to produce a 21.4 mc second IF. The output from the plate of the mixer is taken through capacitor C29 to the common IF output network located in the 30-60 mc tuner.

2.8 BANDSWITCHING

Bandswitching is accomplished by switching the dc voltage sources to the tuners and the converter (see Figure 6-20). The RANGE switch, S1, is divided into four sections. These four sections control the lamps behind the tuning dials, the coxial relays which switch the tuner inputs, and the regulated and unregulated power supply voltages to the tuners and the converter.

2.9 300/75/20-KC BANDWIDTH IF STRIP

The circuits in the 300/75/20-kc bandwidth IF strip are explained in the following paragraphs using the schematic diagram, Figure 6-13. Parts in this IF strip carry the reference designation prefix A8. The 21.4-mc input is connected to the IF strip through input jack J1. An impedance matching network consisting of resistors R1, R2, and R3 feeds the input signal to the SM output jack J2. The IF BANDWIDTH switch determines if the signal is passed through the 300 kc, 75 kc, or 20 kc bandpass amplifiers by supplying base bias from the AGC amplifier to the IF amplifiers for the selected bandwidth.

2.9.1 300-kc Bandwidth IF Amplifiers. - Transistors Q1 and Q4 are the first and second IF amplifiers for the 300-kc bandwidth. The bandwidth is determined by the interstage coupling between Q1 and Q4, a double-tuned, over-coupled network. The tuned circuit in the collector of Q1 consisting of C22, C23, and L4 has the junction of C22 and C23 grounded to provide a signal voltage at the junction of C23 and L4 which is out of phase with the input signal. This voltage is coupled back to the base of Q1 through C14 to neutralize the stage. This same method of neutralization is used by the second IF amplifier, Q4. The gain of both stages is controlled by the AGC amplifier when the function switch is in the FM or AM/AGC positions, and by the RF GAIN control when the function switch is in AM/MAN or CW positions. Placing the IF BANDWIDTH switch in the 75 KC position or the 20 KC position removes base bias from both Q1 and Q4, disabling these stages.

2.9.2 75-kc and 20-kc Bandwidth IF Amplifiers. - Transistors Q3 and Q6 are the first and second IF amplifiers for the 20-kc bandwidth. The 20-kc bandpass is determined by crystal filter FL2 in the coupling network between Q3 and Q6. The tuned collector load of Q6 is shared with Q5 and Q4. Neutralization of Q6 is accomplished by feeding back out-of-phase signal from the junction of C43 and L9 through C44 to the transistor's base. Neutralization of Q3 is not necessary as the heavy loading of the crystal filter in the collector circuit insures that oscillation will not occur. Operation of the 75-kc bandwidth path is identical to the operation of the 20-kc path. The 75-kc path includes stages Q2 and Q5 and filter FL1.

2.9.3 Third and Fourth IF Amplifiers. - The third and fourth IF amplifiers, Q7 and Q8, are common to all three IF bandwidths. Double-tuned, over-coupled networks are used to connect the stages and as the output circuit of Q8. Both transistors are neutralized using the same method described for the 300-kc IF amplifiers. The output of Q8 is fed to the AM detector, CR3, and through a capacitive voltage divider to the FM demodulator.

2.9.4 AM Detector and Output. - The 21.4 mc signal from the fourth IF amplifier is applied to the AM detector, CR3. Capacitors C65 and C68, and resistor R55 form a filter to eliminate the RF signal components from the output of the detector. The audio-video output from the detector is fed through cascaded emitter followers Q9 and Q10 to the AGC amplifier, to section S2B of the function switch, and to rear apron jack, J17, N B AM Video output. Series-connected silicon diodes CR1 and CR2 are used to compensate for the voltage drop across the base-emitter junction of silicon transistors Q9 and Q10. This refinement is included so that the AM video output will be zero volts with no signal input. Resistor R54 connects CR1 and CR2 to the plus 12-volt supply. Thus the junction of R54 and CR1 is clamped at 1.2 volt (0.6 volt drop across each diode). The base of Q9 is clamped at 1.2 volt through resistor R55 which compensates for the 0.6 volt drop across the base-emitter junction of each transistor. Note that the clamp voltage appears at both ends of the AM detector, CR3, so that its operation is not affected.

2.9.5 FM Limiters. - The 21.4-mc signal from the IF Amplifiers is fed to a symmetrical limiter stage formed by A1Q1 and A1Q2 from a capacitive voltage divider. The incoming signal swings about a dc level of approximately plus 3 volts established by base-bias resistors A1R1 and A1R2. Similar networks are in the base circuits of A1Q2, A1Q3, and A1Q4. Transistors A1Q1 and A1Q2 share a common emitter resistor, A1R3. Under no-signal conditions the combined emitter currents of the two transistors develops a voltage across A1R3 which approaches plus 3 volts. When a signal is applied to the base of A1Q1, the positive-going half cycle causes increased conduction through A1Q1 which increases the voltage drop across A1R3. This action causes the collector A1Q2 to move rapidly toward the source voltage level. The negative-going half cycle of the incoming signal reverses the process, reducing the conduction through A1Q1, and increasing the conduction through A1Q2. The base of A1Q2 is held at RF ground potential by capacitor A1C2. Diodes A1CR1, A1CR2 and A1CR3 in the base circuit of A1Q1 prevent large positive-going signals from overloading the limiter, and large negative-going signals from back biasing the base-emitter junction of A1Q1. If the input signal exceeds approximately 7 volts peak-to-peak, Zener diode A1CR2 breaks down and clips positive-going excursions in excess of approximately 4 volts. Negative-going excursions in excess of approximately 4 volts forward bias A1CR3, shorting signal voltage greater than the clipping level to ground. Diode A1CR1 in series with A1CR2 blocks the Zener on negative excursions, preventing it from acting as an ordinary diode. The first limiter output is coupled to the second limiter through capacitor A1C3. Operation of the second limiter is identical to that of the first.

2.9.6 FM Discriminator and Output. - The FM discriminator is a modified Foster-Seeley circuit. Capacitor A1C5 couples the 21.4-mc signal from the second limiter to a resonant circuit consisting of capacitor A1C7, variable inductor A1L3, and the primary of the discriminator transformer, A1T1, which is tuned to the same frequency. An inductive voltage divider is formed by A1L3 and the primary of A1T1, with only a very small percentage of the limiter output appearing across the transformer primary. Capacitor A1C8 couples the reference voltage to the secondary of A1T1. Capacitive center-tapping of the secondary through A1C9 and A1C10 makes it possible to obtain a high degree of discriminator balance unaffected by coil characteristics or the position of the tuning slug. The FM video output from the discriminator is direct coupled to cascaded emitter followers A1Q5 and A1Q6. The output from A1Q6 is coupled through section S2B of the function switch, to the AUDIO GAIN and VIDEO GAIN controls.

2.9.7 Beat Frequency Oscillator. - The BFO is a subassembly on the IF strip; its complete reference designation is A8A2. In the CW mode of operation a 21.4-mc signal from the BFO is injected into the AM detector through capacitor C64. This signal beats with the IF frequency to produce an audible note. The BFO is placed in operation by the application of plus 24 volts through switch section S2C on the main chassis. The plus 24 volts biases diode CR2 in the forward direction, which applies the dc voltage to the collector of transistor Q1. The BFO is a self-regulating Colpitts oscillator. The output signal is derived from the feedback divider circuit consisting of capacitors C1 and C3. With the BFO on, diode CR1 is back biased and has little effect upon the circuit. When switch S2C is moved to any position other than the CW position, minus 24 volts is applied to CR1 and CR2. Diode CR1 is now forward bised and CR2 is back biased. When CR1 is conducting, a short circuit is effectively placed across crystal Y1. If this action were not taken, the crystal would be coupled to the IF strip through capacitors C3 and C64. This could cause undesirable effects in the IF response curve. Back biasing CR2 protects transistor Q1 from having the negative voltage applied to its collector.

2.9.8 AGC Amplifier. - The AGC amplifier controls the gain of two of the RF tuners, the converter and the 300/75/20 kc IF strip when the function switch is in the FM or AM/AGC position.

2.9.8.1 Input to the AGC amplifier is the AM video output from the emitter of Q10. Resistor R58 and capacitor C69 form a modulation filter to remove audio variations from the dc component present at the AM detector output and at the emitter of Q10. A second modulation filter consists of resistor R62 and capacitor C70 in the collector circuit of Q11. Transistor Q11 is cut-off under no-signal conditions. As the output from the AM detector increases in the positive direction, Q11 begins to conduct. The negative-going voltage on the collector is fed to transistor Q12 through section S2A of the function switch. AGC voltage for the IF strip is obtained at the emitter of Q12. With no signal input this point is approximately plus 10 volts. As the base of Q12 goes less positive, as a result of the collector voltage of Q11 decreasing, the emitter also becomes less positive, thus decreasing the gain of the IF strip.

2.9.8.2 AGC voltage for the two tuners and the converter is obtained from the collector of Q13, a PNP transistor. This transistor is biased to saturation until the signal-to-noise ratio at the receiver's output reaches approximately 30 dB, thus providing a delayed AGC voltage for the tuner. Until this signal level is reached, the tuner AGC output at the junction of resistors R66 and R67 is approximately zero and the tuner in use operates at maximum gain. This point is clamped by diode CR4 to prevent it from ever going more positive than 0.5 volt. When the signal-to-noise ratio reaches the proper level, the positive-going collector voltage of Q12 takes control of Q13, biasing it out of saturation. As the input signal strength increases, the collector of Q12 goes more positive, further decreasing the conduction through Q13. This results in the tuner AGC voltage increasing in the negative direction from zero volts towards the minus 24-volt supply. Once the tuner AGC voltage is obtained, the IF AGC voltage remains fairly constant so that the receiver gain is now controlled by the tuner AGC for stronger signals.

2.10 2-MC BANDWIDTH IF STRIP

Figure 6-12 is the schematic diagram for the 2-mc IF strip. Components in the strip carry the reference designation prefix A7. This IF strip contains its own AGC circuit, limiter stages, FM discriminator, and AM and FM output stages.

2.10.1 IF Amplifiers. - There are three stages of IF amplification: transistors Q1, Q2, and Q3. The 2-mc IF bandwidth is determined by interstage coupling. Each stage is overcoupled to produce a dip in the over-all IF response curve. This is to compensate for the peaked output from the tuners so that the over-all response will be essentially flat over the 2-mc bandwidth. The C4, C5, L2 tuned circuit in the collector of Q1 has the junction of C4 and C5 rounded to provide a signal voltage at the junction of C5 and L2 which is out of phase with that at the input. This voltage is coupled back to the base through capacitor C2 to neutralize the stage. Both the second and third IF amplifiers use this same method of neutralization. The gain of Q1 and Q2 is controlled by A2Q2, the AGC regulator transistor. Output from the third IF amplifier, Q3, is fed to the AM detector and, through a capacitive voltage divider, to the limiter stages.

2.10.2 AM Detector and Output. - Diode CR1 detects the AM signal and feeds it to emitter follower stage, A2Q3. The output of A2Q3 is ac coupled through capacitor A2C2 to a second emitter follower, A2Q4. Transistor A2Q4 provides a low-impedance output to the AM VIDEO output jack, J5, on the rear apron of the receiver.

2.10.3 FM Limiters and Discriminator. - The FM limiter and discriminator circuits are nearly identical to those in the 20/75/300-kc IF strip except for component values. For a discussion of the operation of these circuits refer to paragraphs 2.9.5 and 2.9.6. The video output from the Foster-Seeley discriminator is direct coupled to cascaded emitter followers A1Q5, A1Q6, and A1Q7 which provide high current amplification to drive a low-impedance load.

2.10.4 AGC Amplifier. - The AGC amplifier consists of a dc amplifier, A2Q1, and a series regulator, A2Q2. Input voltage to A2Q1 is obtained from the emitter of A2Q3. Resistor A2R1 and capacitor A2C1 form a filter which removes the modulation from the signal so that A2Q1 is supplied with a dc voltage which varies in proportion to the average level of the input carrier signal. This voltage is amplified by A2Q1 which, in turn, controls the current flow through A2Q2. The series regulator is connected between the plus 12-volt supply and the base-bias circuits of the first and second IF amplifier stages. If, for example, the detector output is increasing in the positive direction, control voltage on the base of A2Q2 goes more negative, reducing the positive base bias on the first and second IF stages. This, in turn, decreases the gain of the IF strip. When the average detector output is increasing in the negative direction, the control voltage on the base of A2Q2 goes more positive, resulting in incrased IF gain.

2.11 VIDEO AMPLIFIER

The type 7312 video module amplifies either the AM or the FM output of the multiple-bandwidth IF strip as determined by the setting of the function switch. The reference designation prefix for this assembly is A9; a schematic diagram of the amplifier is shown in Figure 6-14. If the function switch is in the FM position, the FM video signal is applied to the VIDEO GAIN and AUDIO GAIN controls. In any of the other three function switch positions, the AM video signal from the multiple-bandwidth IF strip is applied through switch section S2B to the gain controls. The AM or FM video signal from the arm of potentiometer R9 enters the video amplifier on pin 1 and is applied to the base of Q1 through capacitor C1. The video signal is amplified by Q1 and Q2 and coupled to the output through capacitor C2. This signal is present at the rear apron jack J4 marked AM/FM VID OUTPUT.

2.12 AUDIO AMPLIFIER

The type 7400 audio amplifier (see Figure 6-15) is contained on a separate module and uses three-dc coupled transistors, Q1, Q2, and Q3. The first stage is a conventional voltage amplifier in a common emitter configuration. The input signal from the AUDIO GAIN potentiometer, R10, is applied to this stage through capacitor C1 and resistor R1. The second stage is an emitter follower used to match the high output impedance of the first stage to the low input impedance of the third stage, the power amplifier. An improvement in stability is obtained by a coupling network between the second and third stages. This coupling is made up of capacitor C2 and resistor R8 in parallel. Resistor R7 provides direct signal feedback from the third to the first stage. Resistor R10, in the emitter lead of the output stage, provides additional stability. The output is through transformer T1 which forms the third stage collector load.

2.13 GAIN CONTROL SYSTEM

The over-all system of gain control used within the receiver sections of the receiving system can be understood using the block diagram, Figure 2-1, or the main chassis schematic diagram, Figure 6-20.

2.13.1 Both delayed and undelayed gain control voltages are used in the receiver section of the unit. A delay network in the 300/75/20-kc bandwidth IF strip provides a delayed gain control voltage which is applied to the 30-60 mc tuner, the 60-300 mc tuner, and the converter (see paragraph 2.9.8). The undelayed gain control voltage present at the arm of function switch section S2A is used to control the gain of certain stages in the multiple bandwidth IF strip. The 2-mc bandwidth IF strip uses an AGC voltage derived in that strip to control the gain of its own first and second IF amplifiers.

2.13.2 In the FM or AM/AGC positions of the function switch, an AGC voltage derived in the multiple-bandwidth IF strip is used for gain control in all receiver sections except the 2-mc bandwidth IF strip. In the CW or AM/MAN settings of the function switch, this AGC voltage is replaced by a voltage from the arm of the RF GAIN potentiometer R7.

2.14 SIGNAL MONITOR

The type 79358 signal monitor section of the RS-111-1B-12 Receiving System provides a visual display of the received signal. The input to the signal monitor is the 21.4-mc IF from the tuner in operation. This signal is connected through a resistive pad in the multiple-bandwidth IF strip to jack A5J1 on the signal monitor chassis. Refer to the main chassis schematic diagram, Figure 6-20, and the signal monitor chassis schematic diagram, Figure 6-5, in conjunction with the individual subassembly schematics as necessary during the following paragraphs. The Reference Designation Prefix for the signal monitor is A5.

2.14.1 Bandpass Filter. - The schematic diagram for the type 79313 bandpass filter is Figure 6-10; its reference designation prefix is A5A5. The module contains a three section bandpass filter with a flat bandwidth of 3 mc centered on 21.4 mc. It is included to improve the image rejection of the signal monitor and to reduce signal feedthru of the 13-mc first IF frequency. The filter is tuned by squeezing the turns of the three inductors. This is a factory adjustment which should not require attention in the field.

2.14.2 IF Amplifier Board No. 1. - The signal monitor's IF amplifier is divided into two sections; IF Amplifier Board # 1 and IF Amplifier Board # 2. The Reference Designation Prefix for the type 8132 IF Amplifier Board # 1 is A5A1; its schematic diagram is figure 6-6. This board contains three shaping amplifiers, the sweep oscillator, and the first mixer.

2.14.2.1 The three shaping amplifiers are stagger tuned about 21.4 mc. They provide an essentially flat response curve 3-mc wide when combined with the mixer output response of the tuners. The front-panel mounted GAIN control potentiometer controls the gain of the signal monitor by varying the bias level at the bases of A1Q1 and A1Q2. The incoming signal is fed through dc-blocking capacitor A1C1 to the base of the first shaping amplifier A1Q1. Resistor A1R1 provides a low impedance termination for the bandpass filter. The collector circuit of A1Q1 is tuned by variable inductor A1L1. The signal voltage at the junction of A1L1 and A1R8 is out of phase with the input. This signal is fed back to the base of A1Q1 by A1C2 to neutralize the stage. Resistor A1R5 is included as a parasitic suppressor. The signal from A1Q1 is taken through an impedance matching voltage divider consisting of A1C5 and A1C6. The second and third shaping amplifiers, A1Q2 and A1Q3, are similar to A1Q1. The collector circuit of Q3 is tuned to 21.4 mc. Transistor Q1 is tuned to the high side of the center frequency, and Q2 to the low side. Inductor L3 is heavily loaded by R22 to lower its Q in order to produce a dip in the center of the response through the shaping amplifiers.

2.14.2.2 The sweep oscillator, A1Q5 is basically a Clapp circuit that has its output frequency swept across a maximum range of 3 mc. The oscillator center frequency is 34.4 mc. The frequency is controlled by voltage-variable capacitor (Varicap), A1CR1, whose capacitance varies inversely with the reverse voltage applied across its terminals. Thus, as the voltage across A1CR1 increases, its capacity decreases; a decrease in voltage increases the capacity. The Varicap is connected in series with the oscillator tank circuit and controls the oscillator frequency by varying its tank circuit capacitance. The bias voltage for the Varicap is obtained from the front-panel CENTER FREQ potentiometer, R3, and is approximately 14.5 volts with the control at midrange. This control is used to set the oscillator center frequency to 34.4 mc. The varying voltage applied to the anode terminal of the Varicap is a modified sawtooth waveform. The sawtooth voltage is obtained from the sweep generator module, A3, and is fed through the SWEEP WIDTH control, R2, and the sawtooth shaping network located on the same module. This network in effect distorts the linear sawtooth waveform to compensate for the non-linear changes in capacity of the Varicap with respect to the applied voltage. By making the sawtooth voltage change at a nonlinear rate, the sweep oscillator frequency is made to vary at a linear rate. The output of the sweep oscillator is taken at the junction of A1L6 and A1C25 and coupled through A1C24 to the gate of the first mixer, A1Q4.

2.14.2.3 The first mixer A1Q4 beats the input signal from the shaping amplifiers with the sweep oscillator signal to produce the 13-mc first IF. The mixer utilizes a MOS field-effect transistor (FET). A FET is used to minimize the generation of spurious signals in the mixing process. The IF signal is applied to the source element and the sweep oscillator signal is applied to the gate. The 13-mc first IF is taken from the drain and coupled through a double-tuned under-coupled network to the base of the 13-mc IF amplifier A2Q1 located on IF amplifier board No. 2.

2.14.3 IF Amplifier Board No. 2. - This board contains a 13-mc IF amplifier, the 14-mc crystal oscillator, the second mixer, two 1-mc IF amplifiers, the output amplifier and the vertical detectors. The schematic diagram for this module is figure 6-7; its Reference Designation Prefix is A5A2.

2.14.3.1 The 13-mc output from IF amplifier board No. 1 is coupled to the base of 13-mc IF amplifier A2Q1. The output of A2Q1 is coupled through a second double-tuned network to the base of the second mixer A2Q3. The double-tuned networks provide the required selectivity at this point in the circuit; however, the signal monitors resolution is determined by the selectivity of the 1-mc IF amplifier stages.

2.14.3.2 The 14-mc oscillator, A2Q2, operates in a crystal-controlled Colpitts configuration. Regenerative emitter-to-base feedback to sustain oscillation is through A2R9 to the junction of A2C6 and A2C7 and back to the base. Resistor A2R9 linearizes the sinusoidal output from the oscillator. The output signal is taken from across crystal A2Y1 and injected by means of A2C5 into the double-tuned circuit which couples 13-mc IF amplifier A2Q1, and the second mixer, A2Q3.

2.14.3.3 The second mixer, A2Q3, receives both the 13-mc IF signal and the 14-mc oscillator signal at its base. These two signals are heterodyned to produce the 1-mc second IF. The 1-mc output is coupled through a double-tuned network to the base of the first 1-mc IF amplifier, A2Q4.

2.14.3.4 The 1-mc IF amplifiers, A2Q4 and A2Q5, are narrowband stages providing additional amplification and the selectivity necessary for good resolution. Coupling between these stages is through a double-tuned network. The output from A2Q5 is applied to vertical output amplifier A2Q6.

2.14.3.5 The IF output amplifier, A2Q6, provides drive for the vertical deflection circuits. The stage is tuned to 1 mc by inductor A2L8. The collector of A2Q6 is directly coupled to the push-pull vertical detector circuit made up of diodes A2CR1 through A2CR4. This detector produces two signals of equal amplitude, but of opposite polarity. The positive output is taken from A2CR4 and applied through A2R43 to one vertical deflection plate in the CRT; the negative output is taken from diode A2CR3 and fed through A2R45 to the other vertical deflection plate. Half-wave voltage doubler detector circuits are used to obtain the approximately 26 volts, peak-to-peak, required for one inch of vertical deflection on the CRT. Considering the positive-output circuit, on the negative half-cycles of the input signal A2CR2 is forward biased so that A2C30 charges to the peak value of the applied voltage less the drop across the diode. The current flow through the capacitor results in the end connected to the diodes being positive with respect to the other end. On the positive half-cycles A2CR4 is forward biased so that current now flows charging A2C35. Since A2C30 is already charge to almost the peak appied voltage, and since it is in series with the input voltage, its potential is added to the peak value of the applied voltage. Thus, A2C35 charges to the peak value of the applied voltage, less the drop across A2CR4, plus the charge held by A2C30. As a result, the voltage across A2C35 is approximately twice the peak voltage of the applied RF signal, with the end connected to A2CR4 positive with respect to the other end. This positive voltage is taken at the No. 1 output for application to a vertical deflection plate of the CRT. Similar circuitry provides a negative output at the No. 2 output. A dc positioning voltage is connected from the wiper of potentiometer A2R42 to the negative deflection plate to provide vertical positioning of the trace on the CRT screen.

2.14.4 Sweep Generator. - The type 8232 Sweep Generator generates and amplifies a recurrent sawtooth waveform which is used to drive the sweep oscillator A1Q5. This module also contains the horizontal sweep amplifier and the sawtooth shaping network, as well as a +18V regulator circuit and a sweep oscillator reference voltage regulator. The latter two circuits are mounted on this module as a convenience only and serve no function with other circuitry in the module. A schematic diagram for this module appears in figure 6-8; its Reference Designation Prefix is A5A3.

2.14.4.1 Unijunction transistor Q1, in conjunction with capacitor C1, functions as a sawtooth generator. Transistor Q3 functions as a constant current generator to maximize the linearity of the sawtooth by insuring that the current flowing into C1 remains constant until discharged. The positive voltage on base 2 of Q1 causes a current flow from base 1 to base 2 placing a reverse bias on the PN junction, base 1 to emitter. Capacitor C1 charges from the positive voltage supplied by Q2 until this voltage becomes greater than that of the PN junction. At this time the junction becomes forward bised and provides a low-resistance discharge path to ground for C1. The voltage across C1 rapidly becomes too small to maintain the forward current through the junction, causing a reverse bias condition to be re-established and the next cycle to begin. The relatively slow charge time produces the ramp, or leading edge, of the waveform across C1. The rapid discharge produces the drop-off, or trailing edge of the waveform. The repetition rate is controlled by adjusting the base 2 voltage of Q1, and thereby the point on the ramp where the emitter changes from a reverse to a forward bias condition. The sweep rate calibrate potentiometer, R1, controls the base 2 voltage of Q1. Emitter follower Q5 isolates the sawtooth generator circuit from changing load conditions.

2.14.4.2 The sawtooth waveform present on the emitter of Q5 is coupled through Sweep Cal potentiometer R20 to the base of sweep amplifier Q9. Transistors Q9 and Q10 are connected in a complimentary configuration with negative dc feedback from the collector of Q10 to the emitter of Q9 through resistor R31. The output at the collector of Q10 is coupled through C3 to the SWEEP WIDTH potentiometer R2 located on the main chassis.

2.14.4.3 The sawtooth shaping network is located on the sweep generator module. The network modifies the shape of the sawtooth output of the sweep generator before it is applied to the voltage-variable capacitor (Varicap) in the sweep oscillator circuit. This is done to compensate for the nonlinearity in the change in capacity of the Varicap with a linear sawtooth applied. If an unmodified sawtooth were applied to the Varicap a signal which was, for example, 1 mc higher in frequency than the 21.4- mc center frequency would appear a different distance from the center of the CRT screen than a signal which was 1 mc lower than the center frequency. Thus, by distorting the shape of the sawtooth applied to the Varicap, the frequency sweep is made linear on both sides of the center frequency.

2.14.4.4. The sawtooth output from the sweep generator is fed to the shaping network through the front-panel SWEEP WIDTH control. The SWEEP WIDTH control determines the maximum amplitude of the modified sawtooth wavetrain applied to the sweep oscillator, and thus the maximum frequency sweep of the oscillator. A reverse dc bias of approximately 14.0 volts is applied to the cathode of the Varicap with the front-panel CENTER FREQ control at midrange. With no sawtooth input the sweep oscillator output frequency would be 34.4 mc with this amount of Varicap bias. At the time the sawtooth is at its most negative excursion the reverse voltage across the Varicap is at its maximum. As a result, the Varicap capacity is minimum, so that the sweep oscillator frequency is maximum. At this point diodes CR4, CR5, and CR6 are biased into conduction, placing R36, R37, and R38 in parallel. This parallel combination forms a voltage divider with R39 which governs the output voltage for a given input. As the negative sawtooth voltage increases in a positive direction, a point is reached where it no longer maintains conduction through CR6. When this occurs, resistor R38 is effectively removed from the circuit so that only R36 and R37 are in parallel. This reduces the output voltage for a given input and changes the slope of the sawtooth waveform. As the sawtooth becomes progressively less negative, conduction through CR5 ceases, removing R37 from the circuit and causing a second change in the slope of the sawtooth. The sawtooth is not further modified until it has crossed the zero-volt axis and becomes sufficiently positive to cause CR7 to conduct. Conduction through CR7 places series resistors R40 and R41 in parallel with R39 to cause a third change in the slope of the sawtooth. The final break point occurs when the voltage is positive enough to cause CR8 to conduct, shunting R42 and R43 across R39. Controls are provided to adjust the slope of the sawtooth at the two positive break points to maximize the linearity of the sweep on the low frequency side of the oscillator's dispersion range.

2.14.4.5 The horizontal sweep amplifier circuitry is also located on the sweep generator module. The sawtooth wave train from emitter follower Q5 is coupled through isolation resistor R14 to the HORIZONTAL WIDTH control R5.

This control varies the amplitude of the sawtooth input signal to the horizontal output amplifier to provide a means of adjusting the width of the sweep trace so that it extends across the intire face of the CRT. Transistors Q6 and Q7 form a differential amplifier which directly drives the horizontal CRT deflection plates. High voltage transistors are used for this circuit to provide sufficient output voltage to deflect the electron beam across the face of the CRT without using a step-up transformer. Transistors Q4 and Q8 provide ac and dc coupling respectively between the two stages of the differential amplifier. This circuit arrangement makes it possible to vary the horizontal position control, R8, without changing the gain of the differential amplifier. Both Q4 and Q8 are connected as emitter followers. The sawtooth input to the amplifier is through Q2 which functions as a low-impedance source driver. The sawtooth developed across load resistor R4 is directly coupled to both Q4 and Q6. During the positive going ramp of the sawtooth Q6 conducts harder causing an increase in the voltage developed across load resistor R12. Simultaniously, the sawtooth output from Q4 is fed through R16 to the emitter of Q7. Since the base of this transistor is held at a fixed potential, the positive-going voltage applied to the emitter drives it toward cut off. As a result the collector voltage swings positive approaching the +175V source. Since the horizontal deflection plates are connected directly to the collectors of Q6 and Q7, the electron beam is attracted across the face of the CRT toward the plate connected to Q7. Retrace of the beam occurs on the trailing edge of the sawtooth when the input voltage suddenly drops. The collector voltage of Q6 rises rapidly and that of Q7 drops as Q7 now conducts heavily. The resulting change of potential on the deflection plates returns the electron beam to the opposite side of the screen. By adjusting R25 the horizontal position of the sweep trace can be changed. This control determines the quiescent current through Q6 and Q7, and thus the no-signal voltage present on the deflection plates. Assuming R25 is rotated in the clockwise direction the voltage on the bases of Q7 and Q8 goes more positive causing both transistors to conduct harder. This causes the collector voltage of Q7 to decrease and the emitter voltage of Q8 to increase in the positive direction. This increasing voltage is applied through R15 to the emitter of Q6 causing the transistor to conduct less current, resulting in an increase in collector voltage. The sweep trace will now shift toward the deflection plate attached to the collector of Q6. Rotating R25 in the counterclockwise direction has the opposite effect causing the beam to shift in the direction of the deflection plate connected to the collector of Q7. Resistors R21, R22, and R23 form a current divider which maintains the emitter to base ac impedance of Q7 constant as R25 is varied, thus maintaining the gain of Q7 constant regardless of the setting of the horizontal position control.

2.14.4.6 Transistor Q11 is a series regulator which supplies a regulated +18 volt output from the regulated +24 V source. The base bias is fixed by a voltage divider consisting of resistors R33 and R44 and diode CR3. A drop in output voltage increases the base-emitter voltage causing the transistor to conduct harder and brings the output voltage back to its nominal value. If the output tends to rise, the opposite effect will return the output to normal.

2.14.4.7 The sweep oscillator reference voltage applied across the main chassis center frequency control is obtained from a Zener regulator circuit mounted on the sweep generator module. The regulator consists of dropping resistor R30 and the regulator diode CR1 connected to the +24 V supply.

2.14.5 Marker Oscillator. - The schematic diagram for the crystal marker oscillator is Figure 6-9; its reference designation prefix is A5A4. The oscillator is a crystal-controlled Colpitts that operates on a frequency at 21.4 mc. The output provides a reference pip on the signal monitors CRT trace which indicates the center of the receiver's IF band pass. Marker switch S1 on the front panel is used to energize the oscillator by switching the collector voltage to Q1. Marker adjust potentiometer A1R41 mounted on IF amplifier board No. 1 controls the amplitude of the marker pip by varying the supply voltage to Q1. Regenerative feedback to sustain oscillation is taken at the emitter and fed through R3 to the junction of C1 and C2 and back to the base. When in operation the marker signal is injected into the first mixer, A5A1Q4, on IF amplifier board No. 1.

2.15 AGC MONITOR AMPLIFIER

The Type 7836 AGC Monitor Amplifier (Figure 6-19) is used to drive the receiver's signal strength meter. The Reference Designation Prefix for this module is A15.

2.15.1 The IF AGC signal is applied through isolation resistor R2 to the cathode of Zener diode CR1. The RF AGC signal is similarly applied to the same point through resistor R1. The voltage at the cathode of CR1 is the sum of the two AGC inputs. Zener diodes CR1 and CR2 drop the dc level at the base of Q1 by 18.2 V. Potentiometer R3 adjusts the base bias on Q1 so that the output of the dc amplifier consisting of transistors Q1 and Q2 is set at zero volts with no signal input. The output from the monitor amplifier is zero volts under no signal condition and is driven in the negative direction with increasing signal strength. The output is applied through main chassis resistor R12 to the signal strength meter M1.

2.16 POWER SUPPLY

The RS-111-1B-12 power supply includes the ac input circuits (shown in Figure 6-20), the general power supply regulator (see Figure 6-17), and a regulator for the CRT voltages (see Figure 6-16).

2.16.1 Input Circuit. - The ac input to the unit is connected through the power plug, P26, the 1/2 ampere line fuse, F1, and the on-off switch which is ganged with the AUDIO GAIN control. The arrangement of the two primary windings on the power transformer is controlled by the 115V/230V switch, S4. In the 115V setting of S4, the windings are in parallel; in 230V, the windings are in series and the 1/4 ampere fuse, F2, is included in the circuit. Four of the six-secondary windings on the power transformer operate in conjunction with one of the regulators, and the functions of these windings will be explained in subsequent paragraphs. The other two windings, 7-8 and 15-16, provide 6.3 vac to filaments and lamps, and the filament voltage to the CRT, respectively.

2.16.2 General Regulator. - The ac voltage at the 5-6 winding of T1 enters the regulator on pins 9 and 10 and is applied to a full-wave rectifier formed by CR5 and CR6. The output of the rectifier is connected through pin 14 to a capacitance-input filter formed by C3A, R13, and C3B. The output of the filter is the plus 175 volt supply. The 175 volt source is connected back to the regulator through pin 12 where Zener diode CR20 and resistor R12 provide a regulated 56 volt source. The 13-14 winding on T1 is connected to full-wave rectifiers formed by CR1, CR2 and CR3, CR4. The output of one of these rectifiers is filtered by capacitor C1 on the main chassis and is used as the plus 14 volt source. The output of the other rectifier (through pin 15) operates into a series regulator circuit which includes transistor Q1. The voltage at the emitter of Q1 is minus 6 volts regulated. The 9-10 secondary winding on transformer T1 operates into three full-wave rectifiers located on the general power supply regulator module. One of these rectifiers consists of CR7 and CR8; the output of this rectifier is filtered by C1 and is the 23 volt supply used for relay operation. The output of the second rectifier (CR9, CR10) is connected to a regulator which includes stages Q1, Q3, and Q4. Zener diode CR16 sets the base bias on Q1 which, in turn, sets the base bias on Q3 and Q4. Resistors R7and R8, in conjunction with diodes CR14, CR15, and CR17 provide short-circuit protection for the transistors. The output of this regulator is plus 24 volts. The regulator formed by Q5 and CR19 operates from the 24-volt source to provide a plus 12-volt supply. A similar regulator (Q2, CR13, and CR21) operates from the CR11-CR12 rectifier to supply minus 24 volts.

2.16.3 CRT Regulator. - The output of the 11-12 secondary winding of T1 is connected to the CRT regulator assembly where a full-wave rectifier formed by diodes CR1 and CR2 provide a negative high-voltage source. Tube V1, in series with resistor R1, provides a minus 1200 volt supply at the output of the rectifier. A voltage divider consisting of resistors R2, R4, R6, and R7, and potentiometers R3 and R5 is connected between the minus 1200 volt source and ground. The potential at the arm of R3 is connected to the cathode of the CRT; the potentiometer R3 functions as the INTENSITY control. Potentiometer R5 is the FOCUS control and the arm of this control is connected to the CRT first anode. The minus 1200 volt potential is connected to the CRT control grid.

SECTION III

INSTALLATION AND OPERATION

3.1 INSTALLATION

The RS-111-1B-12 is designed for installation in a standard 19-inch rack. The unit requires 5.25 inches of vertical space and will project 15.5 inches back into the rack. Adequate ventilation should be provided.

CAUTION

Before placing the unit in a rack, first install one pair of shelf angles (Bud type SA-1350 or equivalent), or other hardware which will support the bottom of the chassis. Do not attempt to make an installation using the mounting holes in the front panel as the only means of support.

3.1.1 Power Connection. - Place the rear-apron slide switch in either 115V or 230V depending on the power source to be used. Connect the power cord to the ac outlet; the third pin of the plug grounds the unit. If a three pin receptacle is not available, use the three-to-two pin adapter provided.

3.1.2 Antenna Connections. - Connect the 30-500 mc antenna to the 30-500 MC INPUT jack J1 and the 490-1000 mc antenna to the 490-1000 MC INPUT jack J2 using N-type connectors and 50-ohm coaxial cable.

3.1.3 Audio Output Connection. - The 600-ohm audio output is available at terminals 1 and 2 of the terminal strip marked TB1 AUDIO on the rear apron, and at the PHONES jack on the front panel.

3.1.4 Video Outputs. - The FM video output from the 2-mc bandwidth IF strip is available at the FM VID OUTPUT jack J3; the AM video output from this strip is available at the AM VID OUTPUT jack J5. The video output from the 20/75/300-kc bandwidth IF strip is present at the AM-FM VID OUTPUT jack J4. A Narrow band video output which bypasses the video amplifier is available at jack J17.

3.1.5 Local Oscillator Outputs. - The output of the local oscillator in operation is available at one of the two N-type connectors on the rear apron. The output of the oscillators in the 30-60 mc tuner or the 60-300 mc tuner is present at jack A13J3, LO OUTPUT 30-300 MC. The output of the oscillators in the 235-500 mc tuner or the 490-1000 mc tuner is present at jack A14J3, LO OUTPUT 235-1000 MC.

3.2 OPERATION

The front panel operating controls on the RS-111-1B-12 are explained in the following paragraphs.

3.2.1 Range Switch. - The RANGE switch selects the proper tuner for use as determined by the frequency of the incoming signal. A lamp will light behind the tuning dial of the tuner selected.

3.2.2 Audio Gain Control and Power Switch. - The combination AUDIO GAIN control and ac power switch turns on the receiving system when rotated clockwise from the PWR OFF position. Once the unit is operating, the control sets the audio level at the PHONES jack and at the rear apron audio terminal strip.

3.2.3 Function Switch. - Set the function switch in one of the four positions before the receiver is tuned. This switch affects only the 20/75/300-kc bandwidth IF strip. When this switch is in the AM/MAN or CW positions, the gain of the receiver must be manually controlled using the RF GAIN potentiometer. The BFO is automatically activated when the switch is placed in the CW mode.

3.2.4 BFO Tuning Control. - The BFO TUNING control allows the operator to change the pitch of the CW audio signal from the 20/75/300-kc bandwidth strip when the function switch is placed in the CW position. Place the BFO TUNING control at mid-position when tuning; the audio pitch can then be increased or decreased as desired.

3.2.5 IF Bandwidth Switch. - The IF BANDWIDTH switch controls the bandwidth of the 20/75/300-kc IF strip. Set this switch as desired depending on the characteristics of the signal to be received. When searching for signals, it is advisable to use the widest bandwidth.

3.2.6 RF Gain Control. - The RF GAIN control is used to manually control the gain of the receiver sections (except the 2-mc bandwidth IF strip) when the function switch is in the AM/MAN or the CW position. In the other two function switch positions, the RF GAIN control is inoperative

3.2.7 Signal Strength Meter. - The signal strength meter indicates the relative incoming signal strength. The meter is not calibrated in any particular units.

3.2.8 Cathode Ray Tube. - The CRT displays the signals present at the output of the tuner in operation.

3.2.9 Gain Control. - Use the GAIN control to adjust the amplitude of the display on the CRT. Adjustment of this control does not affect the receiver sections of the unit.

3.2.10 Sweep Width Control. - The SWEEP WIDTH control varies the display bandwidth on the CRT. Clockwise rotation of the control increases the bandwidth. When searching for a signal, place the control at the maximum clockwise position and then reduce the bandwidth as desired by counter-clockwise rotation of the control after the signal has been located.

3.2.11 Center Frequency Control. - Use the CENTER FREQ control to move the displayed pips on the CRT either right or left as desired or to place a particular pip on the center marker before reducing the displayed bandwidth.

3.2.12 Focus and Intensity Controls. - Adjust the FOCUS and INTENSITY controls for maximum sharpness and the desired brightness of the CRT trace.

3.2.13 Marker Switch. - When used, the MARKER switch produces a pip on the CRT at 21.4 mc. This pip indicates the center of the IF response.

SECTION IV

MAINTENANCE

4.1 GENERAL

The type RS-111-1B-12 Receiving System has been carefully designed so that it will operate for long periods of time with little more than routine maintenance. Should trouble occur, it is important that maintenance personnel be familiar with Section II, in which the circuits are described. In addition, they should refer to Figures 5-1 through 5-44 where the component locations are shown; to the schematic diagrams, Figure 6-1 through 6-20; and to Table 4-1, the tube and transistor element voltages.

CAUTION

All maintenance work within this unit should be kept to a minimum and performed only by trained and experienced personnel. The placement of components and the dress of leads in the equipment have been carefully designed to give optimum performance. In replacing any components, great care should be exercised to duplicate the exact physical layout of the original assembly.

4.2 MAINTENANCE OF GEAR TRAINS AND TUNING DIALS (Refer to Figures 5-45 and 5-46).

If it should be necessary to align the RF tuners in the RS-111-1B-12, the gear trains and tuning dials must first be checked for mechanical alignment. The gear train mechanisms use friction drive and rely on the stops of the inductuner to halt the turning in the case of the 30-60 mc, 60-300 mc, 235-500 mc RF tuners, and on stops mounted on the gear train to halt the turning in the case of the 490-1000 mc tuner.

4.2.1 30-60 mc RF Tuner. - Proceed as follows:

(1) Release the Allen head set screws on each side of the coupling between the gear train shaft and the inductuner shaft.

(2) Rotate the inductuner shaft to maximum clockwise position.

(3) Turn the dial until the hairline is at the second mark above 62.

(4) Tighten the coupling between the gear train and the inductuner shaft.

(5) Check the operation by turning the tuning crank counterclockwise until the inductuner no longer turns. The dial should read at the mark just beyond 30.

4.2.2 60-300 mc RF Tuner. - Proceed as follows:

(1) Release the Allen head set screws on each side of the coupling between the gear train and the inductuner shaft.

(2) Rotate the inductuner shaft to maximum clockwise position.

(3) Turn the dial until the hairline is at the first mark above 300.

(4) Tighten the coupling between the gear train and the inductuner shaft.

(5) Check the operation by turning the tuning crank counterclockwise until the inductuner no longer turns. The dial should read at the mark just beyond 60.

4.2.3 235-500 mc RF Tuner. - Proceed as follows:

(1) Release the Allen head set screws on each side of the coupling between the gear train shaft and the inductuner shaft.

(2) Rotate the inductuner shaft to maximum clockwise position.

(3) Turn the dial until the hairline is at the mark above 500.

(4) Tighten the coupling between the gear train and the inductuner shaft.

(5) Check the operation by turning the tuning crank counterclockwise until the inductuner no longer turns. The dial should read at the fifth mark beyond 235 mc.

4.2.4 490-1000 mc RF Tuner. - Proceed as follows:

(1) Release the Allen head set screws on each side of the coupling between the gear train shaft and the RF tuner shaft.

(2) Rotate the RF tuner shaft to maximum counterclockwise position.

(3) Turn the dial until the hairline is at the mark below 490. The gear train should be stopped at the low end gear train stop at this point.

(4) Tighten the coupling between the gear train and the RF tuner shaft.

(5) Check the operation by turning the tuning crank clockwise until the RF tuner shaft no longer turns. The dial should read between 1000 and the mark beyond 1000.

4.3 PLUG-IN MODULES

The plug-in modules can be easily removed by pulling them out of the receptacles into which they are fitted. The numbers on the pins coming out of the modules correspond to the numbers indicated on the main chassis schematic diagram, Figure 6-20, at the points where the connecting leads pass through the line outlining each module on the schematic. For example, the output from the audio amplifier to the PHONES jack is through pins 11 and 13 of the receptacle into which the audio amplifier module is plugged.

4.4 TROUBLESHOOTING

Most troubles will be caused by failures of the fuse, tubes, diodes, or relays. The proper functioning of all these parts should be assured either by test or by replacement with parts known to be good before any further troubleshooting is carried out. After the above measure has been carried out, initial troubleshooting should be directed toward localizing the problem to a specific portion of the receiving system. In the case of the plug-in modules, a quick check can be made by simply plugging in a new module known to be good. Another procedure which should be considered for localizing troubles is to feed in a signal at the antenna jack and then check the signals present at each test point. To this end, it is desirable that all maintenance personnel familiarize themselves with the alignment procedures, even if an alignment is not required, because those procedures include methods of checking performance which may help in analyzing the cause of the trouble. In addition, be certain that the power supply is functioning normally before any other circuit is suspected.

4.5 ALIGNMENT INSTRUCTIONS

The alignment procedures in this book are suitable for performance in the field when making periodic performance checks, or when making adjustments after replacing tubes or components. Only those controls specifically referred to within a series of steps given for aligning a particular circuit affect the work in that circuit. Those controls not mentioned in any one series of steps may be left in any position. The alignment of this receiver should be performed only with suitable equipments by technicians thoroughly familiar with the receiver. If the limits and tolerances specified in the following steps cannot be obtained during a field alignment, a factory alignment is necessary.

4.5.1 Use of Marker During Alignment. - A post-detection type of marker adder is recommended, and the alignment procedures in this book assume that one is to be used. However, if such a marker adder is not available, the marker generator output should be loosely coupled to the sweep generator output. This can be done by connecting the marker signal source to a turn or two of insulated wire wrapped around the sweep generator lead near the point of connection to the circuit under test, or by coupling to the sweep generator lead through a small capacitor. To insure that the addition of the marker is not affecting the response curve, disconnect the marker generator and observe that no change in the curve's shape or symmetry occurs.

4.5.2 Use of Oscilloscope During Alignment. - The vertical and horizontal amplifier inputs on the oscilloscope should be set in the dc coupled mode. The dc component of the signal on the vertical input should be cancelled out by applying an equal voltage to the unused vertical differential scope input, since the dc component sometimes makes it impossible to center the signal vertically. Otherwise it will sometimes be necessary to use the ac coupled mode.

A low-capacity shielded cable should be used to connect to the oscilloscope, and the shield should be grounded as closely as possible to the point to which the center conductor is connected.

4.5.3 Equipments Required. - The following equipments, or their equivalents, are required to perform the complete receiving system alignment.

(1) Signal Generator, Hewlett-Packard 612A

(2) Signal Generator, Hewlett-Packard 608D

(3) Signal Generator, Hewlett-Packard 606A

(4) Sweep Generator, Telonic, Model SM-2000 with Type L-4 plug-in head

(5) Sweep Generator, Jerrold 900A

(6) VTVM, RCA Type WV-98B

(7) Power Supply, Eico 1020

(8) Oscilloscope, Tektronix 503

(9) Marker, 21.4 mc, Type C, for Telonic SM-2000

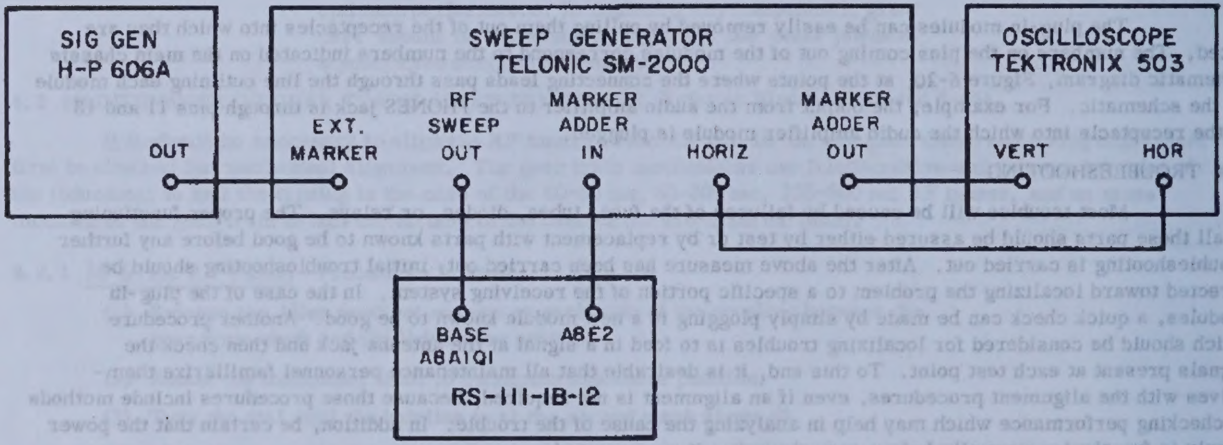

SIG GEN
H-P 606A
OUT
SWEEP GENERATOR
TELONIC SM-2000
EXT.
MARKER
RF
SWEEP
OUT
MARKER
ADDER
IN
HORIZ
MARKER
ADDER
OUT
OSCILLOSCOPE
TEKTRONIX 503
VERT
HOR
BASE
A8A1Q1
A8E2
RS-111-1B-12

Figure 4-1. Equipment Setup, 20-kc/75-kc/300-kc IF Alignment

4.6 20/75/300 KC IF ALIGNMENT

The alignment procedure for the multiple bandwidth IF strip is presented in the following paragraphs. It will be necessary to remove the IF chassis to perform the alignment.

4.6.1 Initial Settings. - The following steps should be performed before beginning alignment:

(1) Set the receiver function switch to FM position; bandwidth switch to 300 kc.

(2) Disconnect IF strip from RF tuners by removing P21 from A8J1.

(3) Set oscilloscope horizontal sensitivity to obtain a 10 cm wide sweep, and the vertical sensitivity to 0.2 volt per cm.

(4) Install the L4 plug-in head in the sweep generator.

(5) Set the sweep generator sweep rate to line frequency.

(6) Calibrate signal generator to produce a 21.4-mc marker.

4.6.2 Discriminator Alignment. - Proceed as follows:

(1) Remove Q8.

(2) Remove bottom cover from the IF strip.

(3) Set up equipment as shown in Figure 4-1.

(4) Adjust sweep generator output to display an S-curve response on the oscilloscope.

(5) Adjust A1L3 for amplitude symmetry of the S-curve and A1T1 for zero crossing of the S-curve at 21.4 mc. A typical response is shown in Figure 4-2.

(6) Replace Q8.

4.6.3 300-kc IF Alignment. - Proceed as follows:

(1) Set up the equipment as shown in Figure 4-1, except that the sweep output is connected to the junction of L13 and C55.

(2) Adjust L16 and L15 for a maximum amplitude response centered on the 21.4-mc marker.

(3) Change the sweep generator output to A8J1.

(4) Adjust L13, L12, L10, L9, L5, and L4 (in that order), for a maximum amplitude response.

(5) Replace bottom cover.

(6) Readjust L5 and L4 for a symmetrical, single-peak response, centered at 21.4 mc, with a 3-db bandwidth of 300 kc. Readjust L10 and L9 if necessary. A typical response is shown in Figure 4-3.

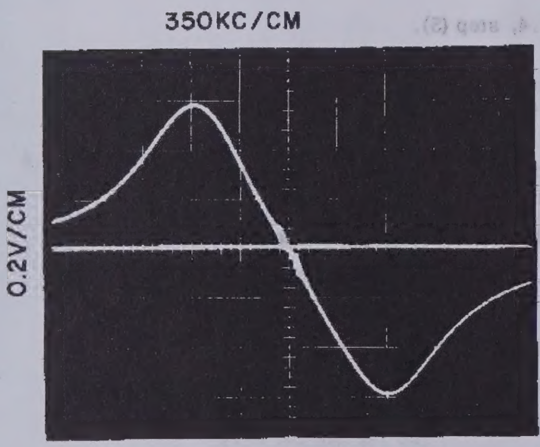


Figure 4-2. Typical Response Curve, 300-kc Discriminator Alignment

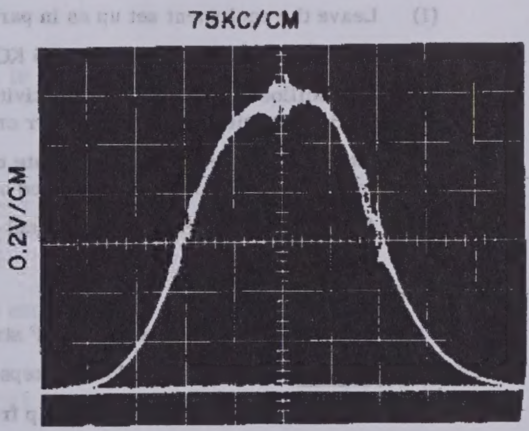


Figure 4-3. Typical Response Curve, 300-kc Bandwidth IF Alignment

4.6.4 20-kc IF Alignment. - Proceed as follows:

(1) Leave equipment set up as in paragraph 4.6.3, step (6).

(2) Set the bandwidth switch to the 20 KC position.

(3) Set oscilloscope horizontal sensitivity to obtain a 10 cm wide sweep, and the vertical sensitivity to 0.2 volt per cm.

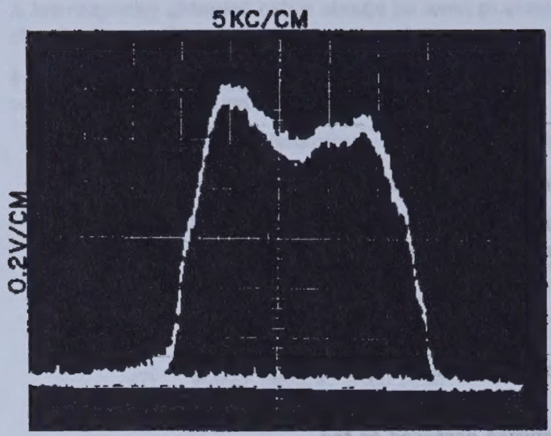


Figure 4-4. Typical Response Curve, 20-kc IF Bandwidth IF Alignment

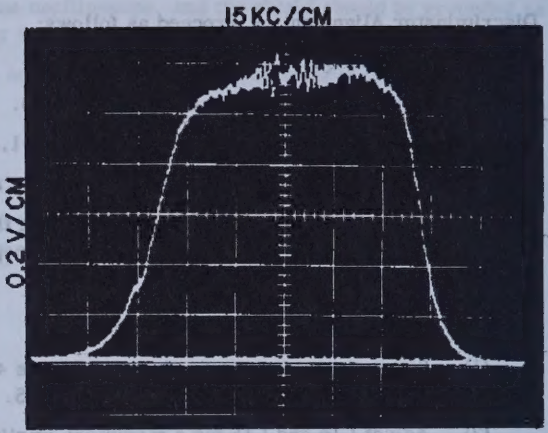


Figure 4-5. Typical Response Curve, 75-kc Bandwidth IF Alignment

(4) Set the sweep generator sweep rate to 5 cps; adjust frequency and output level until a response curve is displayed on the oscilloscope.

(5) Adjust L7 and L3 for a symmetrical response similar to the response shown in Figure 4-4.

4.6.5 75-kc IF Alignment. - Proceed as follows:

(1) Leave the equipment set up as in paragraph 4.6.4, step (5).

(2) Set the bandwidth switch to the 75 KC position.

(3) Set oscilloscope horizontal sensitivity to obtain a 10 cm wide sweep, and the vertical sensitivity to 0.2 volt per cm.

(4) Set the sweep generator sweep rate to 5 cps; adjust frequency and output level until a response curve is displayed on the oscilloscope.

(5) Adjust L6 and L2 for a symmetrical response similar to the response shown in Figure 4-5.

4.7 2-MC IF ALIGNMENT

The alignment of the 2-mc bandwidth IF strip is explained in the following paragraphs.

4.7.1 Preliminary Steps. - Perform the following steps prior to the alignment:

(1) Remove the 20/75/300-kc IF strip from the receiver.

(2) Disconnect plug P20 from A7J2.

(3) Remove the bottom cover from the 2-mc IF strip.

(4) Set IF BANDWIDTH switch to 2 MC; place function switch in FM position.

4.7.2 Discriminator Alignment. - Proceed as follows:

(1) Connect equipment as shown in Figure 4-6.

(2) Adjust power supply for a +4 volt output.

(3) Set output frequency of sweep generator to 21.4 mc. Turn internal 21.4-mc marker on.

(4) Calibrate 606A signal generator for a 19 9 mc output; calibrate the 608D signal generator for a 22.9 mc output.

(5) Adjust sweep generator and oscilloscope controls to display an "S" response curve.

(6) Adjust A7A1L3 for amplitude symmetry and A7A1T1 for zero crossing of the "S" curve. The 3-mc markers should appear at the peaks of the response. A typical response is shown in Figure 4-7.

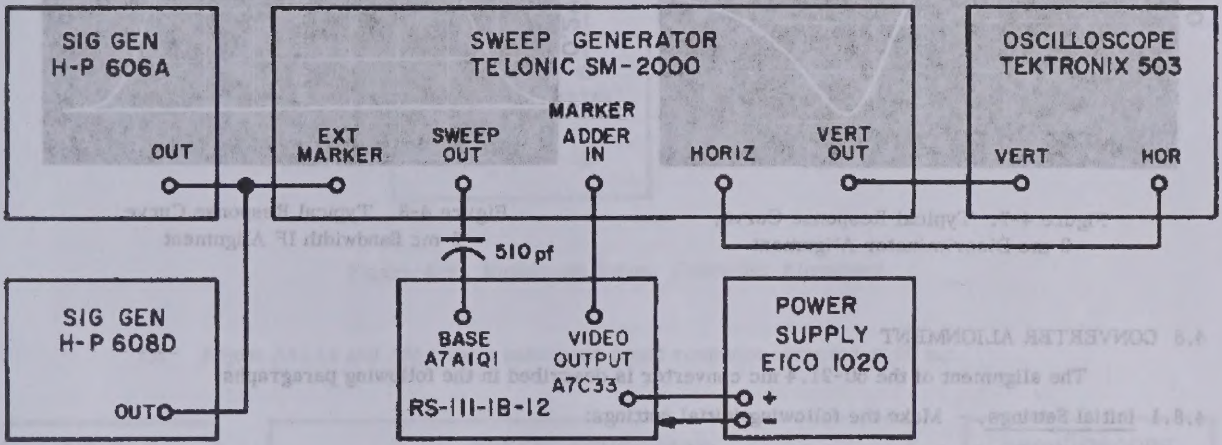

SIG GEN
H-P 606A
OUT
SWEEP GENERATOR
TELONIC SM-2000
EXT MARKER
SWEEP OUT
MARKER ADDER IN
HORIZ
VERT OUT
OSCILLOSCOPE
TEKTRONIX 503
VERT
HOR
510 pf
SIG GEN
H-P 608D
OUT
BASE A7A1Q1
VIDEO OUTPUT A7C33
RS-111-1B-12
POWER SUPPLY
EICO 1020
+
−

Figure 4-6. Equipment Setup, 2-mc IF Discriminator Alignment

4.7.3 IF Alignment. - Proceed as follows:

(1) Set output frequency of 606A signal generator to 19.4 mc and output frequency of 608D signal generator to 22.4 mc.

(2) Adjust power supply for +6.5 volt output.

(3) Connect equipment as shown in Figure 4-6 except that the sweep generator output is connected to A7J1 and the marker adder input is connected to the emitter of A7Q3.

(4) Set output frequency of sweep generator to 21.4 mc; turn internal 21.4-mc marker on.

(5) Adjust sweep generator and oscilloscope controls to display a response curve.

(6) Adjust A7L9, A7L8, A7L6, A7L5, A7L3, and A7L2, in the order given, for a maximum amplitude, symmetrical response centered about the 21.4-mc marker. The 2-mc markers should appear at the 3-db points on the response curve. A typical response is shown in Figure 4-8.

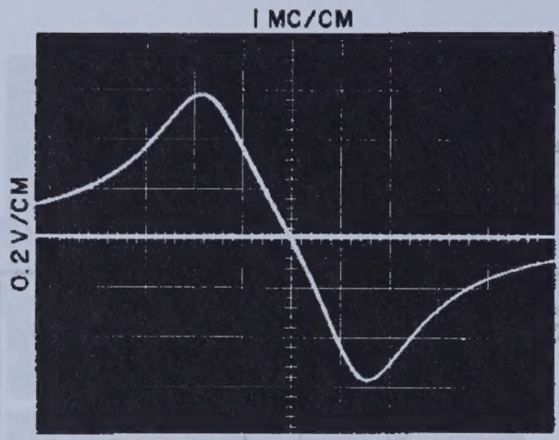


Figure 4-7. Typical Response Curve, 2-mc Discriminator Alignment

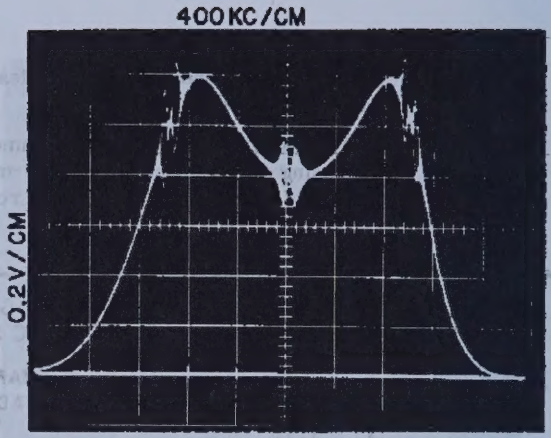


Figure 4-8. Typical Response Curve, 2-mc Bandwidth IF Alignment

4.8 CONVERTER ALIGNMENT

The alignment of the 60-21.4 mc converter is described in the following paragraphs.

4.8.1 Initial Settings. - Make the following initial settings:

(1) Set the function switch to the AM/AGC position.

(2) Set the RANGE switch to the 235-500 MC position.

(3) Set the IF BANDWIDTH switch to the 300 KC position.

(4) Set sweep generator and signal generator to 60 mc.

4.8.2 V1 to V3 Interstage Alignment. - Proceed as follows:

(1) At A6C7, ground the AGC line.

(2) Connect equipment as shown in Figure 4-9.

(3) Set sweep generator and signal generator to 60 mc.

(4) Adjust oscilloscope until a response curve is displayed on the scope.

(5) Adjust A6L1 for a peak response.

(6) Adjust A6L3 and A6L4 for a maximum double-tuned response centered at 60 mc.

4.8.3 A3V3 to A6V1 Interstage Alignment. - Proceed as follows:

(1) At A6C7, ground the AGC line.

(2) Set the signal generator to exactly 325 mc.

(3) Connect signal generator to J1 rear panel and tune the RS-111-1B-12 to the signal generator using the tuning meter to indicate proper tuning.

(4) Set equipment as shown in Figure 4-10.

(5) Set the sweep generator to 325 mc.

(6) Calibrate the signal generator to produce a 60-mc marker.

(7) Set oscilloscope vertical sensitivity at 50 millivolts per cm and adjust sweep generator sweep width until a response curve is displayed on the oscilloscope.

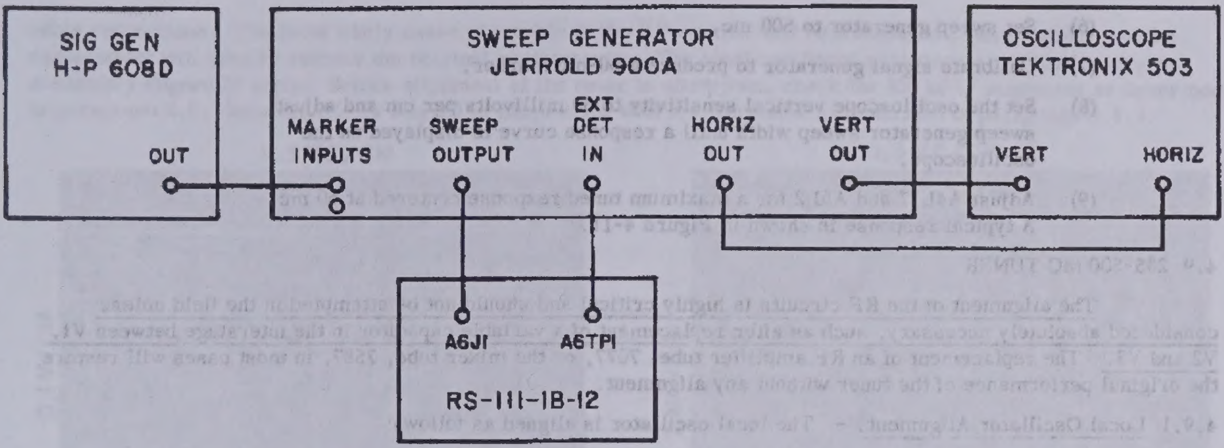

SIG GEN
H-P 608D
OUT
SWEEP GENERATOR
JERROLD 900A
MARKER INPUTS
SWEEP OUTPUT
EXT DET IN
HORIZ OUT
VERT OUT
OSCILLOSCOPE
TEKTRONIX 503
VERT
HORIZ
A6J1
A6TP1
RS-111-1B-12

Figure 4-9. Equipment Setup, Converter Alignment

(8) Adjust A3L14 and A6L1 for a maximum tuned response centered at 60 mc.

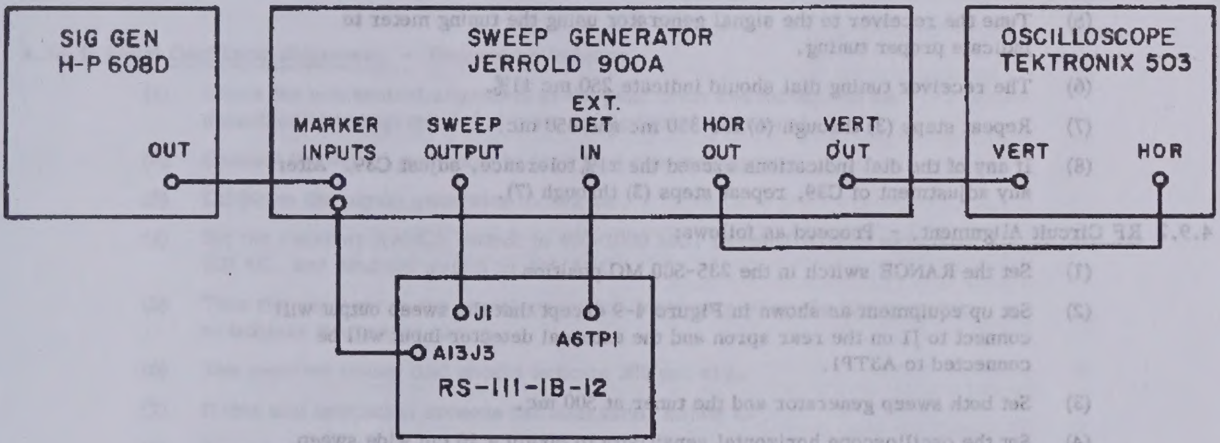

SIG GEN
H-P 608D
OUT
SWEEP GENERATOR
JERROLD 900A
MARKER INPUTS
SWEEP OUTPUT
EXT. DET IN
HOR OUT
VERT OUT
OSCILLOSCOPE
TEKTRONIX 503
VERT
HOR
J1
A6TP1
A13J3
RS-111-1B-12

Figure 4-10. Equipment Setup, Converter and Tuner Alignment

4.8.4 A4V3 to A6V2 Interstage Alignment. - Proceed as follows:

(1) Ground the AGC line at A6C7.

(2) Set the signal generator to exactly 500 mc.

(3) Set the receiver RANGE switch to 490-1000 MC position.

(4) Connect signal generator to J2 rear panel and tune the receiver to the signal generator using the tuning meter to indicate proper tuning.

(5) Set up equipment as shown in Figure 4-10, except the sweep output will connect to J2 on the rear apron.

(6) Set sweep generator to 500 mc.

(7) Calibrate signal generator to produce a 60-mc marker.

(8) Set the oscilloscope vertical sensitivity to 50 millivolts per cm and adjust sweep generator sweep width until a response curve is displayed on the oscilloscope.

(9) Adjust A4L17 and A6L2 for a maximum tuned response centered at 60 mc. A typical response is shown in Figure 4-11.

4.9 235-500 MC TUNER

The alignment of the RF circuits is highly critical and should not be attempted in the field unless considered absolutely necessary, such as after replacement of a variable capacitor in the interstage between V1, V2 and V3. The replacement of an RF amplifier tube, 7077, or the mixer tube, 7587, in most cases will restore the original performance of the tuner without any alignment.

4.9.1 Local Oscillator Alignment. - The local oscillator is aligned as follows:

(1) Check the mechanical alignment of the gear train and tuning dial as described in paragraph 4.2.3 prior to electrical alignment.

(2) Connect the signal generator to jack J1 on the rear apron.

(3) Calibrate the signal generator to 250 mc.

(4) Set the receiver RANGE switch to 235-500 MC, IF BANDWIDTH switch to 300 kc, and function switch to AM/AGC.

(5) Tune the receiver to the signal generator using the tuning meter to indicate proper tuning.

(6) The receiver tuning dial should indicate 250 mc ±1%.

(7) Repeat steps (3) through (6) for 350 mc and 450 mc.

(8) If any of the dial indications exceed the ±1% tolerance, adjust C39. After any adjustment of C39, repeat steps (3) through (7).

4.9.2 RF Circuit Alignment. - Proceed as follows:

(1) Set the RANGE switch in the 235-500 MC position.

(2) Set up equipment as shown in Figure 4-9 except that the sweep output will connect to J1 on the rear apron and the external detector input will be connected to A3TP1.

(3) Set both sweep generator and the tuner at 500 mc.

(4) Set the oscilloscope horizontal sensitivity to obtain a 10 cm wide sweep, and the vertical sensitivity to 50 millivolts per cm.

(5) Adjust the sweep generator sweep width and frequency until a response curve is displayed on the oscilloscope.

(6) Adjust A3C6, A3C13, A3C17 and A3C24 for a maximum tuned response centered at 500 mc. A typical response is shown in Figure 4-12. If the alignment is being performed after the replacement of one of these four capacitors, adjust only the one that has been replaced.

(7) Adjust A3C1 for maximum gain at 500 mc.

(8) Inductor A3L14 is aligned in conjunction with the converter; see paragraph 4.8.3.

4.10 490-1000 MC TUNER

Under no circumstances should adjustment be made in the high band RF tuner section. The tuned circuits are factory aligned, and will need no further adjustment. If the receiver is unusually noisy, check all cable connections. The most likely cause of trouble in the RF section will be a damaged crystal mixer, and its replacement will usually restore the original performance. The local oscillator adjustments are made using an accurately aligned IF strip. Before alignment of the tuner is attempted, check the 300 kc IF alignment as described in paragraph 4.6. Inductor L17 is aligned in conjunction with the converter as described in paragraph 4.8.4.

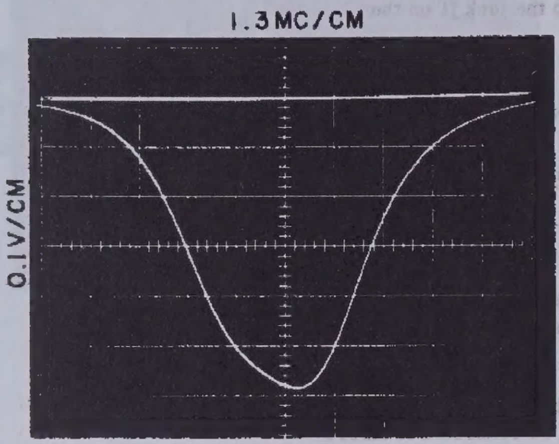


Figure 4-11. Typical Response Curve, A4V3 to A6V2 Interstage Alignment

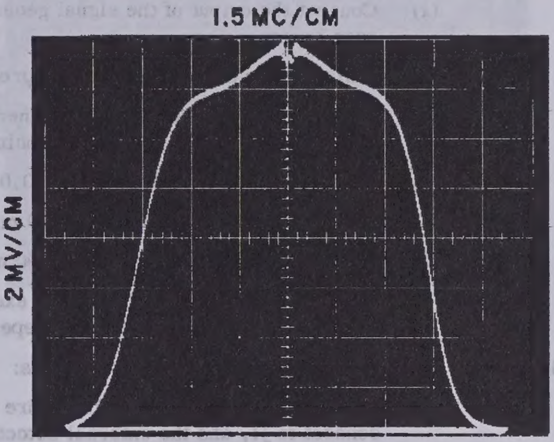


Figure 4-12. Typical Response Curve, 235-500 mc Tuner Alignment

4.10.1 Local Oscillator Alignment. - Proceed as follows:

(1) Check the mechanical alignment of the gear train and tuning dial as described in paragraph 4.2.4 prior to electrical alignment.

(2) Connect the signal generator to jack J2 at the rear apron.

(3) Calibrate the signal generator to 500 mc.

(4) Set the receiver RANGE switch to 490-1000 MC, IF BANDWIDTH switch to 300 KC, and function switch to AM/AGC.

(5) Tune the receiver to the signal generator frequency using the tuning meter to indicate the proper tuning.

(6) The receiver tuning dial should indicate 500 mc ±1%.

(7) If this dial indication exceeds the tolerance, adjust C7.

(8) Repeat steps (3) through (5) for 1000 mc.

(9) If the dial reading exceeds the ±1% tolerance, adjust C6.

4.10.2 Checking High Band Tuner Oscillator Injection Current. - To check the high band local oscillator injection current, connect a milliammeter to the mating plug provided for jack J4 and insert the plug into the jack. This places the meter in series with the crystal mixer dc ground return. The normal current reading is greater than 0.5 ma and less than 2.5 ma.

4.11 60-300 MC TUNER

The tuner is aligned in part using an accurately aligned IF strip. Before an alignment of the tuner is attempted, check the 300 kc IF alignment as described in paragraph 4.6. Check the mechanical alignment of the gear train and tuning dial as described in paragraph 4.2.2 prior to electrical alignment.

4.11.1 Initial Settings. - Make the following initial settings:

(1) Set the function switch in the AM/MAN position.

(2) Adjust the RF GAIN control fully clockwise.

(3) Set the RANGE switch in the 60-300 MC position.

(4) Set the IF BANDWIDTH switch to the 300 KC position.

4.11.2 Local Oscillator Alignment. - Proceed as follows:

(1) Connect the output of the signal generator to the jack J1 on the rear apron.

(2) Calibrate the signal generator to produce a 100 mc signal.

(3) Tune the receiver to the signal generator frequency using the tuning meter to indicate proper tuning.

(4) The tuning dial should indicate 100.0 mc ±1%.

(5) Repeat steps (2) through (5) for 60 mc.

(6) Repeat steps (2) through (5) for 290 mc.

(7) If any of the tuning dial indication exceed the ±1% tolerance, adjust C29. If C29 is adjusted, repeat steps (2) through (7).

4.11.3 RF Circuit Alignment. - Proceed as follows:

(1) Set up equipment as shown in Figure 4-9 except the sweep output will connect to J1, and the external detector will be connected to A2TP1.

(2) Set the receiver tuning dial to 100 mc and the sweep generator to 100 mc.

(3) Calibrate the signal generator to produce a 100-mc marker.

(4) Remove the local oscillator tube V4.

(5) Set the oscilloscope horizontal sensitivity to obtain a 10 cm wide sweep, and the vertical sensitivity to 50 millivolts per cm.

(6) Adjust sweep generator sweep width and frequency until a response curve is displayed on the oscilloscope screen.

(7) Adjust C11 and C18 for a symmetrical, double-tuned response, with the 100 mc marker appearing between the center of the response and the low frequency peak. Adjust C15 for a peak-to-peak bandwidth of 3.5 mc. A typical response is shown in Figure 4-13.

(8) Adjust C5 for a maximum amplitude of the response at 100 mc.

(9) Check the response at 60 mc and 300 mc. The response shape will vary but the marker should still be on or between the peaks of the response curve.

(10) Re-install the local oscillator tube, V4.

4.12 30-60 MC TUNER

The tuner is aligned in part using an accurately aligned IF strip. Before an alignment of the tuner is attempted, check the 300 KC IF alignment as described in paragraph 4.6. Check the mechanical alignment of the gear train and tuning dial as described in paragraph 4.2.1 prior to electrical alignment.

4.12.1 Initial Settings. - Make the following initial settings:

(1) Set the IF BANDWIDTH switch to 300 KC.

(2) Set the RANGE switch in the 30-60 MC position.

(3) Set the function switch in the AM/MAN position.

4.12.2 Local Oscillator Alignment. - Proceed as follows:

(1) Connect the output of the signal generator to the input jack J1 on the rear apron.

(2) Calibrate the signal generator to produce a 30 mc signal.

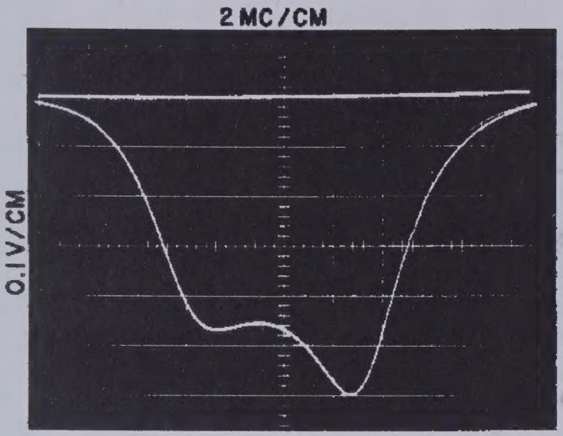


Figure 4-13. Typical Response Curve, 60-300 mc Tuner Alignment

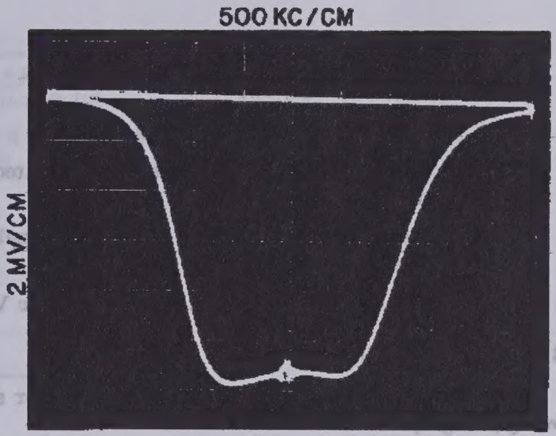


Figure 4-14. Typical Response Curve, 30-60 mc Tuner Alignment

(3) Tune the receiver to the signal generator frequency using the tuning meter to indicate proper tuning.

(4) The receiver tuning dial should indicate 30.0 mc ±1%.

(5) Repeat steps (2) through (5) for 40 mc, 50 mc and 60 mc.

(6) If any of the tuning dial indications exceed the ±1% tolerance, adjust C27. After any adjustment of C27, repeat steps (2) through (6).

4.12.3 RF Circuit Alignment. - Proceed as follows:

(1) Set up the equipment as shown in Figure 4-9, except the sweep output is connected to J1 on the rear apron and the external detector is connected to A1TP1.

(2) Adjust RF GAIN for a -1.5 volt reading at A1C38.

(3) Set the receiver tuning dial to 30 mc and the sweep generator to 30 mc.

(4) Remove the local oscillator tube, V4.

(5) Set the oscilloscope horizontal sensitivity to obtain a 10 cm wide sweep, and the vertical sensitivity to 50 millivolts per cm.

(6) Adjust sweep generator sweep width and frequency until a response curve is displayed on the oscilloscope.

(7) Using a calibrated 30-mc marker from the signal generator, adjust C3 for maximum amplitude of the response at 30 mc.

(8) Adjust C13 and C15 for a symmetrical response centered at 30 mc. A typical response is shown in Figure 4-14.

(9) Check the response at 40 mc, 50 mc and 60 mc. The response shape will vary but the markers should still be on or between the peaks of the response curve.

(10) Re-install the local oscillator tube, V4.

4.12.4 Mixer Plate Coil Alignment. - Proceed as follows:

(1) Set IF BANDWIDTH switch to the 20 KC position.

(2) Set function switch to AM/MAN position.

(3) Set RF Gain fully cw.

(4) Set receiver tuning dial to 30.0 mc.

(5) From the signal generator, feed a calibrated 21.4-mc signal to the input jack J1.

(6) Connect the VTVM to A8E2 and adjust signal generator output level until a -3.5 volt indication is obtained.

(7) Adjust L5 for a maximum indication on the VTVM.

4.13 SIGNAL MONITOR

The alignment procedure for the signal monitor section of the receiving system is presented in the following paragraphs.

4.13.1 Initial Control Settings. - Begin the alignment by adjusting the controls as follows. After the initial preset, do not change position of any control unless instructed to do so.

(1) CENTER FREQ control at midrange

(2) SWEEP WIDTH control fully counterclockwise

(3) MARKER off

(4) GAIN control fully counterclockwise

(5) INTENSITY control for visible trace

(6) FOCUS control for fine definition of trace

(7) Vertical centering control A5A2R42 for positioning of trace on black base line

4.13.2 1-MC and 13-MC IF Alignment. - Proceed as follows:

(1) Connect the signal generator output to A5A2TP1.

(2) Adjust the signal generator frequency to exactly 1.0 mc using the generator's internal crystal calibration.

(3) Reducing signal generator output as necessary, adjust A5A2L3 through A5A2L8 for maximum upward deflection of the base line on the CRT.

(4) Connect the signal generator output to A5A1TP2.

(5) Using the internal calibration, adjust the signal generator frequency to exactly 13.0 mc.

(6) Reducing signal generator output as necessary, adjust A5A1L4, A5A1L5, A5A2L1 and A5A2L2 for maximum upward deflection of the base line on the CRT.

4.13.3 21.4 MC Shaping Amplifier Alignment. - Proceed as follows:

(1) Set up the equipment as shown in Figure 4-15.

(2) Calibrate the signal generator to produce a 21.4-mc marker.

(3) Set oscilloscope vertical sensitivity to 20 mV per cm and the horizontal sensitivity as required to produce a trace 10-cm wide.

(4) Adjust the GAIN control on the signal monitor fully clockwise.

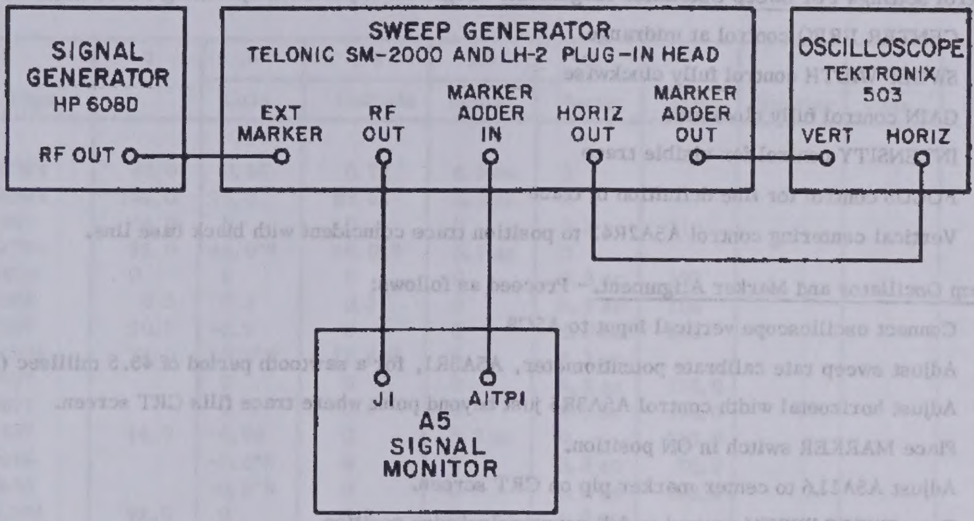

SIGNAL GENERATOR
HP 608D
RF OUT
SWEEP GENERATOR
TELONIC SM-2000 AND LH-2 PLUG-IN HEAD
EXT MARKER
RF OUT
MARKER ADDER IN
HORIZ OUT
MARKER ADDER OUT
OSCILLOSCOPE
TEKTRONIX 503
VERT
HORIZ
J1
A1TP1
A5 SIGNAL MONITOR

Figure 4-15. Test Equipment Setup, Shaping Amplifier Alignment

(5) Adjust the sweep generator output level, sweep width and sweep frequency until a response curve is displayed on the oscilloscope.

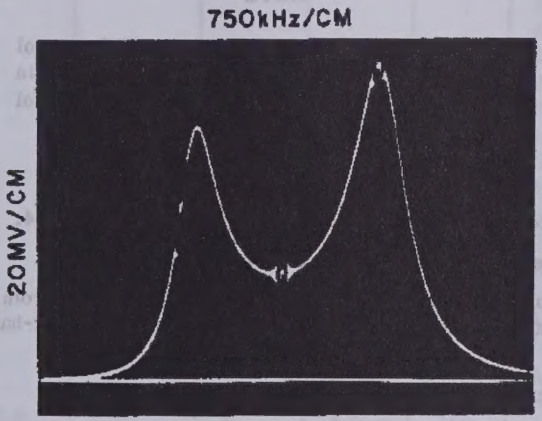


Figure 4-16. Typical Response Curve, Shaping Amplifier

(6) Adjust A5A1L1, A5A1L2, and A5A1L3 for a response similar to the one shown in Figure 4-16. The marker is at 21.4 mc. The shaping amplifiers are stagger tuned with A5A1L3 affecting the middle of the response, A5A1L1 affecting the high-frequency side, and A5A1L2 the low-frequency. Use the signal generator to check for a 3-dB bandwidth of 3 mc at 19.9 mc and at 22.9 mc. To insure maximum flatness of response, it is recommended that the adjustments be touched up while feeding a 21.4-mc signal through the mixer output network of one of the tuners.

4.13.4 Control Settings For Sweep Oscillator Alignment. - Begin the adjustment by setting the controls as follows:

(1) CENTER FREQ control at midrange

(2) SWEEP WIDTH control fully clockwise

(3) GAIN control fully clockwise

(4) INTENSITY control for visible trace

(5) FOCUS control for fine definition of trace

(6) Vertical centering control A5A2R42 to position trace coincident with black base line.

4.13.5 Sweep Oscillator and Marker Alignment. - Proceed as follows:

(1) Connect oscilloscope vertical input to A5C8

(2) Adjust sweep rate calibrate potentiometer, A5A3R1, for a sawtooth period of 45.5 millisec (22 cps.)

(3) Adjust horizontal width control A5A3R5 just beyond point where trace fills CRT screen.

(4) Place MARKER switch in ON position.

(5) Adjust A5A1L6 to center marker pip on CRT screen.

(6) Turn SWEEP WIDTH control to full counterclockwise position.

(7) Adjust A5A1L6 for maximum upward deflection of the trace. If trace goes off screen, adjust marker amplitude potentiometer, A5A1R41, and readjust A5A1L6 until trace is about one-fourth inch from top of screen.

(8) Return SWEEP WIDTH control to full clockwise position. If marker pip is not centered, adjust horizontal position control, A5A3R25, until it is centered.

NOTE

Do not adjust front-panel CENTER FREQ control or A5A1L6 to center marker pip at this point in the alignment. The horizontal position control must be used.

4.13.6 Linearity Adjustments.

(1) Check to see that controls are in positions given in paragraph 4.13.4.

(2) Connect signal generator to A5J1; set for 22.9 mc CW output.

(3) Adjust sweep calibrate control A5A3R20 to place the 22.9-mc pip from the signal generator on the fifth vertical graticule from the center on the right-hand side of the screen.

(4) Change signal generator frequency to 20.2 mc.

(5) Adjust nominal linearity control A5A3R41, and if necessary, maximum linearity control, A5A3R43, to place 20.2 mc pip on the fourth graticule from the center on the left-hand side of the screen.

(6) Decrease signal generator frequency to 19.9 MHz.

(7) Adjust maximum linearity control A5A3R43 to place the 19.9 mc pip on the fifth graticule from the center on the left-hand side of the screen.

(8) Return signal generator to 20.2 mc and recheck linearity at this point. Due to the interaction between A5A3R41 and A5A3R43 it may be necessary to repeat steps 4 through 7 several times to achieve optimum linearity at the low-frequency extremes of the sweep oscillator dispersion.

Table 4-1. Type RS-111-1B-12 Receiving System, Tube and Transistor Element Voltages

Ref. Desig.	Type	2	4 Grid	8 Cathode	10 Heater	12 Heater	Plate	Emitter	Base	Collector
A1V1	6CW4	82.0	0.14	0.72	6.3 ac	0				
A1V2	6CW4	144.0	76.0	82.0	6.3 ac	0				
A1V3	7587	66.0	0	0	0	6.3 ac	110			
A1V4	6CW4	92.0	46.0*#	46.0*#	6.3 ac	0				
A2V1	8058	0	0	0	0	6.3 ac	102			
A2V2	8058	0.5	0.5	0.5	0	6.3 ac	108			
A2V3	7587	20.0	-0.9	0	0	6.3 ac	110			
A2V4	6CW4	73.0	10.9*#	11.8*#	0	6.3 ac				
A3V1	7077		0	0	0	6.3 ac	118.0			
A3V2	7077		0	0.6	0	6.3 ac	118.0			
A3V3	7587	14.0	-0.96	0	6.3 ac	0	180.0			
A3V4	7486		-1.6*#	0	0	6.3 ac	86.0			
A4V1	7486		-0.5*#	0	0	6.3 ac	100.0			
A [illegible]	6CW4	92.0	0	0.5	0	6.3 ac				
A4V3	6CW4	170	83.0	92.0	0	6.3 ac				
A5A1Q1	2N3933							3.0	3.7	14.0
A5A1Q2	2N3933							2.9	3.6	14.1
A5A1Q3	2N3933							3.6	4.3	13.3
A5A1Q4	3N128							2.2(1)	0 (2)	17.6(3)
A5A1Q5	2N3933							7.6	8.3	17.4
A5A2Q1	2N3933							4.9	5.6	16.3
A5A2Q2	2N3933							2.0	2.7	6.4
A5A2Q3	2N3933							5.0	5.7	16.2
A5A2Q4	2N3933							4.9	5.6	16.3
A5A2Q5	2N3933							4.8	5.5	16.3
A5A2Q6	2N3933							3.2	3.9	22.7
A5A3Q1	2N2646							0	6.7(4)	16.0(5)
A5A3Q2	2N2270							4.8	5.4	22.4
A5A3Q3	2N4037							6.7	5.6	19.3
A5A3Q4	2N2270							4.2	4.8	22.4
A5A3Q5	2N2270							4.2	4.8	22.4
A5A3Q6	2N3440							6.2	6.7	22.4
A5A3Q7	2N3440							4.2	4.8	115
A5A3Q8	2N2270							4.1	4.6	114
A[illegible]Q9	2N2270							4.5	5.0	22.4
A5A3Q10	2N4037							7.3	7.7	44.0
A5A3Q11	2N2270							6.7	44.0	44.5
A5A4Q1	2N3933							15.8	16.3	22.4
A6V1	7587	1.38	0.9	0	0	6.3 ac	180			
A6V2	7587	36	-0.94	0.24	0	6.3 ac	180			
A6V3	7587	21.0	-0.7	0	0	6.3 ac	130			
A6V4	6CW4	84.0	-4.4	0	0	6.3 ac				
A7Q1	2N2708							2.5	3.1	12.0
A7Q2	2N2708							2.3	3.0	11.2
A7Q3	2N2708							2.0	2.8	10.4
A7A1Q1	2N706							2.7	3.3	11.2
A7A1Q2	2N706							2.7	3.4	11.4
A7A1Q3	2N706							2.7	10.2	11.6

Table 4-1. Type RS-111-1B-12 Receiving System, Tube and Transistor Element Voltages (Cont.)

Ref. Desig.	Type	2	4	8	10	12				
			Grid	Cathode	Heater	Heater	Plate	Emitter	Base	Collector
A7A1Q4	2N706							2.7	3.2	11.6
A7A1Q5	2N2270							1.6	2.1	12.0
A7A1Q6	2N2270							1.4	1.6	12.0
A7A1Q7	2N2270							0.1	0.5	9.7
A7A2Q1	2N2270							11.0	11.7	12.0
A7A2Q2	2N2270							0	-0.44	11.7
A7A2Q3	2N2270							-0.46	0.14	13.8
A7A2Q4	2N2270							0.48	1.1	11.4
A7A2Q5	2N2270							0.11	0.94	11.3
A8Q1	2N2708							2.0	2.8	11.9
A8Q2	2N2708							1.9	2.7	11.8
A8Q3	2N2708							2.0	2.8	11.7
A8Q4	2N2708							2.0	2.8	11.9
A8Q5	2N2708							1.8	2.6	11.8
A8Q6	2N2708							1.9	2.7	11.8
A8Q7	2N2708							2.1	2.8	10.9
A8Q8	2N2708							2.6	3.4	11.6
A8Q9	2N697							0.7	1.2	12.2
A8Q10	2N697							0	0.6	12.2
A8Q11	2N697							1.44	-.04	12.2
A8Q12	2N697							10.8	11.4	11.0
A8Q13	2N1131							8.2	9.0	11.6
A8A1Q1	2N706							2.7	3.2	11.4
A8A1Q2	2N706							2.7	3.3	11.3
A8A1Q3	2N706							3.0	3.1	11.5
A8A1Q4	2N706							3.0	3.1	11.5
A8A1Q5	2N697							0.68	1.2	12
A8A1Q6	2N697							-24	0.68	12
A8A2Q1	2N706							17.0	16.0	23.0
A9Q1	2N697							1.37	2.0	25.0
A9Q2	2N526							25.0	25.0	16.0
A10Q1	2N335							0.6	1.25	6.0
A10Q2	2N335							4.7	5.4	24.0
A10Q3	2N2270							1.2	1.5	22.5
A11V1	GV3A1200						1100			
A12Q1	2N2270							24.5	25.0	31.0
A12Q2	2N2270							24.5	25.0	31.0
A12Q3	2N1038							-25.0	-24.5	-33.0
A15Q1								-15.5	-14.3	8.7
A15Q2								9.3	8.7	-7.3

Cathode Ray Tube

Ref. Desig.	Type	1	2	3	4	5	6	7	8	CAP
A5V1	3ASP1	113	110	-1420(6)	-1440	-740	86	95	-1420(6)	48

Table 4-1. Type RS-111-1B-12 Receiving System, Tube and Transistor Element Voltages (Cont.)

Test Conditions: All voltages are positive dc with respect to chassis unless otherwise indicated. Readings taken with RCA WV-98B VTVM with 115 vac applied to the receiving system. Control settings as follows: FOCUS, INTENSITY, CENTER FREQ, GAIN, SWEEP WIDTH, RF GAIN, BFO TUNING, VIDEO GAIN, AUDIO GAIN, and FINE TUNING at max cw and no signal input; RANGE switch set to tuner being measured; IF BANDWIDTH to IF strip being measured; function switch in CW.

NOTES:

* - indicates 1 meg resistor used in series with probe.

# - indicates reading which may vary with tuning.

(1) - Source

(2) - Gate

(3) - Drain

(4) - Base 1

(5) - Base 2

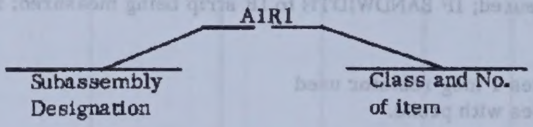
(6) - A5V1 pin 3 to 8 potential is 6.3 vac (filiment)

SECTION V

REPLACEMENT PARTS LIST

5.1 UNIT NUMBERING METHOD

The unit numbering method of assigning reference designations (electrical symbol numbers) has been used to identify assemblies, subassemblies (and modules), and parts. An example of the unit method follows:



Read from right to left as: First (1) resistor (R) of
first (1) subassembly (A)

As shown on the main chassis schematic, components which are an integral part of the main chassis have no subassembly designation.

5.2 REFERENCE DESIGNATION PREFIX

Partial reference designations have been used on the equipment and on the illustrations in this manual. The partial reference designations consist of the class letter(s) and identifying item number. The complete reference designations may be obtained by placing the proper prefix before the partial reference designations. Prefixes are provided on drawings and illustrations following the notation "REF DESIG PREFIX".

5.3 LIST OF MANUFACTURERS

Vendor Code	Name and Address	Vendor Code	Name and Address
01121	Allen-Bradley Company 1201 South 2nd Street Milwaukee, Wisconsin 53204	05820	Wakefield Engineering, Inc. 139 Foundry Street Wakefield, Massachusetts 01880
01281	TRW Semiconductors, Inc. 14520 Aviation Boulevard Lawndale, California 90260	06001	General Electric Co. Capacitor Department P. O. Box 158 Irmo, South Carolina 29063
02114	Ferroxcube Corporation of America Mt. Marion Road Saugerties, New York 12477	14099	Semtech Corporation 652 Mitchell Road Newbury Park, California 91320
04013	Taurus Corporation 1 Academy Hill Lambertville, New Jersey 08530	14632	Communication Electronics, Inc. 6006 Executive Boulevard Rockville, Maryland 20852
04435	Jettron Products Inc. P. O. Box 274 56 Route 10 Hanover, New Jersey 07936	15558	Micon Electronics, Incorporated Roosevelt Field Garden City, New York 11534
04713	Motorola Semiconductor Prod., Inc. 5005 East McDowell Road Phoenix, Arizona 85008	18469	Servometer Corporation 82 Industrial East Clifton, New Jersey 07012

Vendor Code	Name and Address
18915	The Bircher Corporation Industrial Division 745 Monterey Pass Road Monterey Park, California 91754
28520	Heyman Manufacturing Co. 147 N. Michigan Avenue Kenilworth, New Jersey 07033
37942	P. R. Mallory and Company, Inc. 3029 E. Washington Street Indianapolis, Indiana 46206
54753	General Instrument Corp. F. W. Sickles Division 165 Front Street Chicopee, Massachusetts 01014
56289	Sprague Electric Company North Adams, Massachusetts 01247
63060	The Victoreen Instrument Co., Inc. 10101 Woodland Avenue Cleveland, Ohio 44104
71279	Cambridge Thermionic Corporation 430 Concord Avenue Cambridge, Massachusetts 02138
71400	Bussman Manufacturing Division of McGraw-Edison Co. 2538 W. University Street St. Louis, Missouri 63107
1590	Centralab, Division of Globe-Union, Inc. 932 E. Keefe Avenue Milwaukee, Wisconsin 53212
71700	Cornish Wire Company 732 Third Avenue New York, New York 14301
71785	Cinch Manufacturing Company Howard B. Jones Division 1026 South Homan Avenue Chicago, Illinois 60624
72136	Electro Motive Manufacturing Co., Inc. South Park & John Streets Willimantic, Connecticut 06226
72982	Erie Technological Products, Inc. 644 West 12th Street Erie, Pennsylvania 16512
73138	Beckman Instruments, Inc. Helipot Division 2500 Harbor Boulevard Fullerton, California 92634
73899	JFD Electronics Company Division of Stratford Retreat House 15th at 62nd Street Brooklyn, New York 11219
74306	Piezo Crystal Company 265 East Pomfret Street Carlisle, Pennsylvania 17013
74868	Amphenol Corporation Amphenol RF Division 33 East Franklin Street Danbury, Connecticut 06810
75042	IRC Incorporated 401 North Broad Street Philadelphia, Pennsylvania 19108
76055	Mallory Controls, Division of P. R. Mallory and Co., Inc. State Road 28 W Frankfort, Indiana 46041
80131	Electronic Industries Association 2001 Eye Street, N. W. Washington, D. C. 20006
81073	Grayhill Incorporated 561 Hillgrove Avenue LaGrange, Illinois 60525
81312	Winchester Electronics, Division of Litton Industries, Inc. Main Street & Hillside Avenue Oakville, Connecticut 06779
81349	Military Specifications
82219	Sylvania Electric Products, Inc. Electronic Tube Division Emporium, Pennsylvania 15834

Vendor Code	Name and Address
82389	Switchcraft, Incorporated 5527 North Elston Avenue Chicago, Illinois 60630
82872	Roanwell Corporation 180 Varick Street New York, New York 10014
83330	Herman H. Smith, Inc. 812 Snediker Avenue Brooklyn, New York 11207
88245	Litton Industries USECO Division 13536 Saticoy Street Van Nuys, California 91402
91418	Radio Materials Company 4242 West Bryn Mawr Avenue Chicago, Illinois 60646
91506	Augat, Incorporated 33 Perry Avenue Attleboro, Massachusetts 02703
91662	Elco Corporation Maryland Road & Computer Avenue Willow Grove, Pennsylvania 19090
94144	Raytheon Company Industrial Components Operation 465 Centre Lexington, Massachusetts 02169
95121	Quality Components, Inc. P. O. Box 113 St. Mary's, Pennsylvania 15857
95146	Alco Electronics Products, Inc. 3 Wolcott Avenue Lawrence, Massachusetts 01843
95263	Leecraft Mft. Co. Inc. 21 - 16 44th Road Long Island, New York 11101
99687	Raytheon Company Equipment Division Wayland, Massachusetts 01778
99848	Wilco Corporation 4030 W. Tenth Street Indianapolis, Indiana 46222

5.4 PARTS LIST

When ordering replacement parts from CEI, specify the type and serial number of the equipment, and the reference designation and description of each part ordered. The Vendors and Vendor Part Numbers listed are included as a guide to the user of the equipment in the field and do not necessarily agree with the parts installed in the equipment. Except in those cases specifically noted, the replacement part may be obtained from any vendor as long as the physical and electrical parameters of the part selected agree with the original part.

NOTE

> As improved semiconductors become available it is the policy of CEI to incorporate them in proprietary products. For this reason some transistors and diodes installed in an equipment may not agree with those specified in the parts lists and schematic diagrams of this manual. However, the semiconductors designated in the manual may be substituted in every case with satisfactory results.

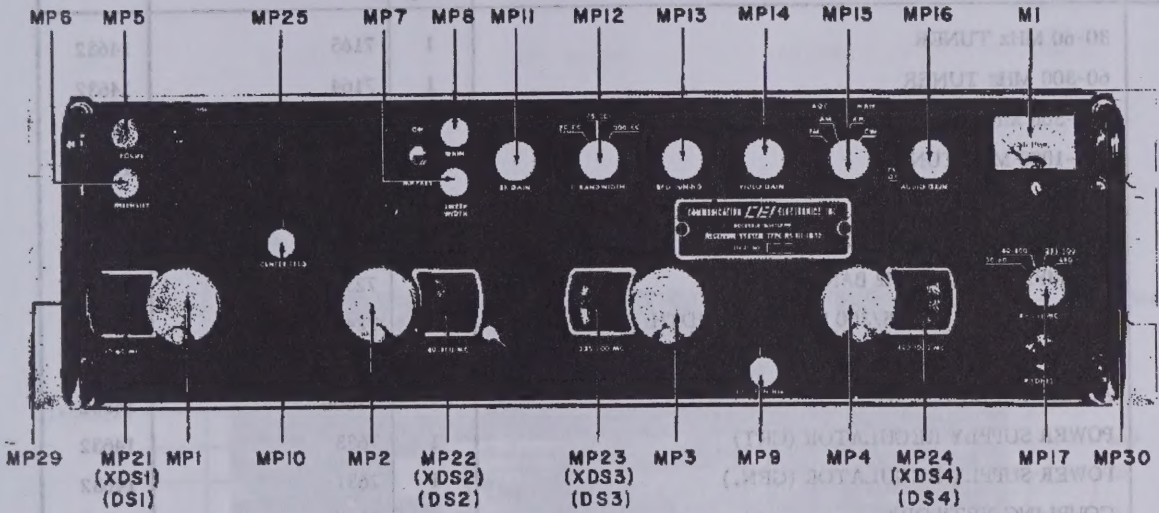

MP6
MP5
MP25
MP7
MP8
MP11
MP12
MP13
MP14
MP15
MP16
M1
MP29
MP21 (XDS1) (DS1)
MP1
MP10
MP2
MP22 (XDS2) (DS2)
MP23 (XDS3) (DS3)
MP3
MP9
MP4
MP24 (XDS4) (DS4)
MP17
MP30

Figure 5-1. Location of Mechanical Parts, Type RS-111-1B-12 Receiving System Front Panel

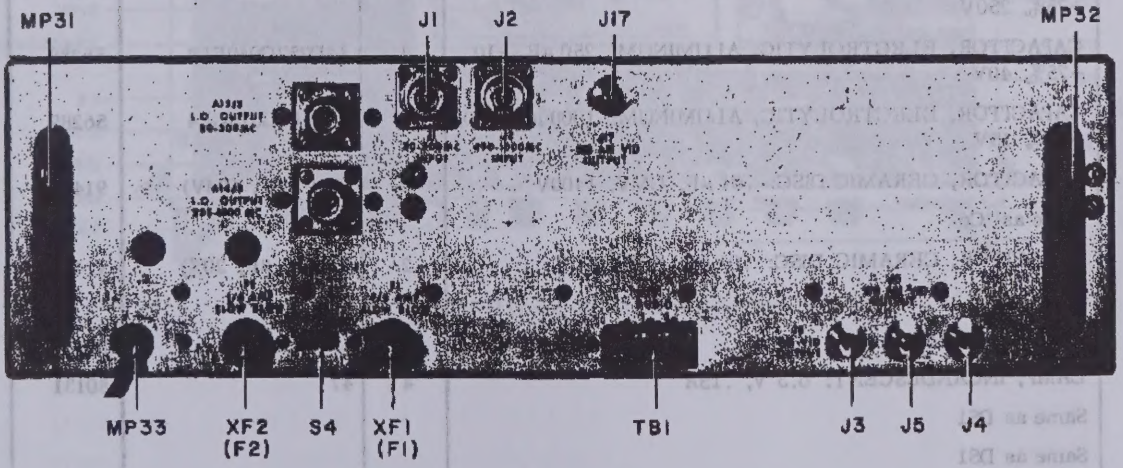

MP31
J1
J2
J17
MP32
MP33
XF2 (F2)
S4
XF1 (F1)
TB1
J3
J5
J4

Figure 5-2. Location of Mechanical Parts, Type RS-111-1B-12 Receiving System Rear Apron

5.4.1 Type RS-111-1B-12 Receiving System, Main Chassis

Ref Desig	Description	Qty Per Assy	Vendor Part No.	Vendor Code
A1	30-60 MHz TUNER	1	7165	14632
A2	60-300 MHz TUNER	1	7164	14632
A3	235-500 MHz TUNER	1	7162	14632
A4	490-1000 MHz TUNER	1	7163	14632
A5	SIGNAL MONITOR	1	79358	14632
A6	60-21.4 MHz CONVERTER	1	7120	14632
A7	IF AMPLIFIER, 2 MHz BANDWIDTH	1	7233	14632
A8	IF AMPLIFIER, 20/75/300 kHz BANDWIDTH	1	7245	14632
A9	VIDEO AMPLIFIER	1	7312	14632
A10	AUDIO AMPLIFIER	1	7400B	14632
A11	POWER SUPPLY REGULATOR (CRT)	1	7633	14632
A12	POWER SUPPLY REGULATOR (GEN.)	1	7631	14632
A13	COUPLING NETWORK	2	7917	14632
A14	Same as A13			
A15	AGC MONITOR AMPLIFIER	1	7836	14632
C1	CAPACITOR, ELECTROLYTIC, ALUMINUM: 500 µF, -10, +75%, 15V	1	34D507G015FJ4	56289
C2	CAPACITOR, ELECTROLYTIC, ALUMINUM: 50 µF, -10, +75%, 12V	1	30D506G012CB2	56289
C3	CAPACITOR, ELECTROLYTIC, ALUMINUM: 40/40 µF, -10, +75%, 250V	1	TVL-2520	56289
C4	CAPACITOR, ELECTROLYTIC, ALUMINUM: 250 µF, -10, +75%, 40V	1	34D257G040FL4	56289
C5	CAPACITOR, ELECTROLYTIC, ALUMINUM: 1000 µF, -10, +75%, 15V	1	34D108G015GL4	56289
C6	CAPACITOR, CERAMIC DISC: .01 µF, GMV, 1400V	2	U(.01 µF, GMV)	91418
C7	Same as C6			
C8	CAPACITOR, CERAMIC DISC: .01 µF, 20%, 500V	2	SM(.01 µF, 20%)	91418
C9	Same as C8			
CR1	DIODE, ZENER	1	1N753A	80131
DS1	LAMP, INCANDESCENT: 6.3 V, .15A	4	47	80131
DS2	Same as DS1			
DS3	Same as DS1			
DS4	Same as DS1			
F1	FUSE, 3AG, Slow-Blow: 1/2A	1	MDL-1/2	71400
F2	FUSE, 3AG, Slow-Blow: 1/4A	1	MDL-1/4	71400

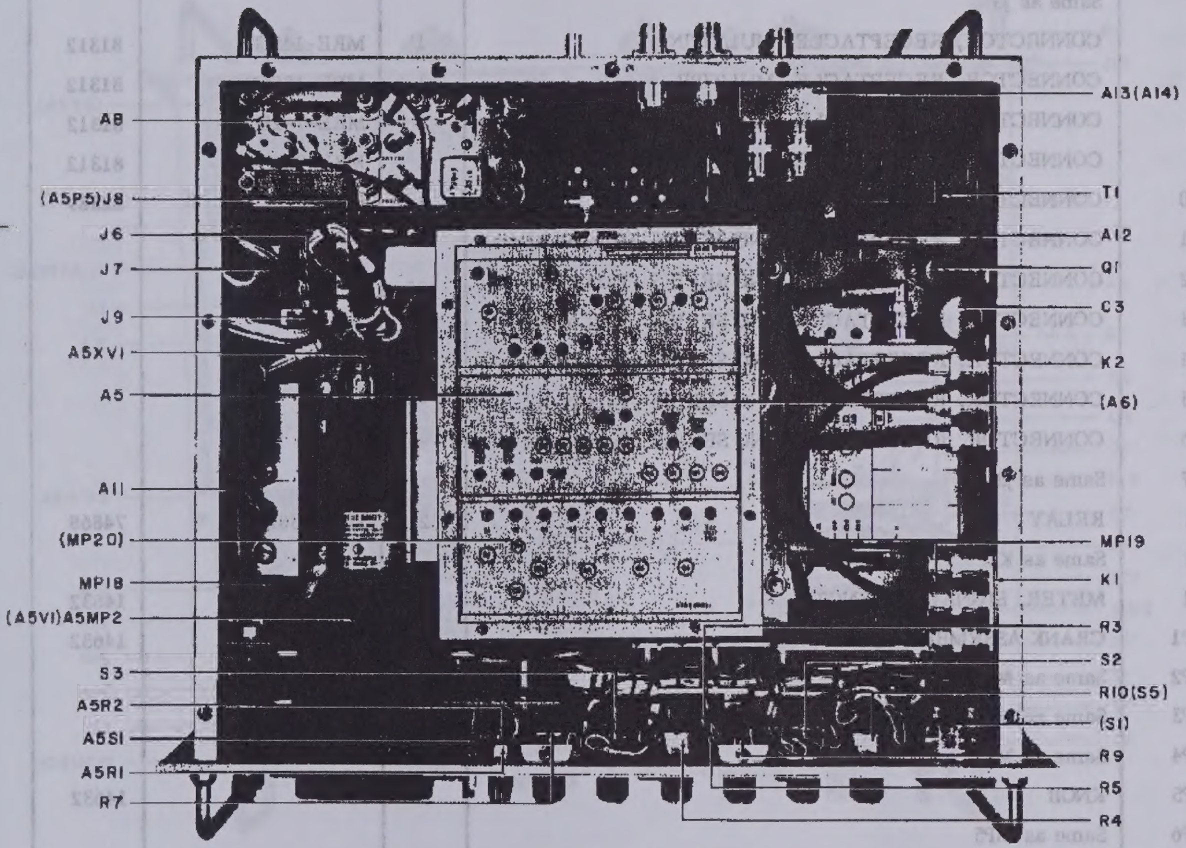

A8
(A5P5)J8
J6
J7
J9
A5XV1
A5
A11
(MP20)
MP18
(A5V1)A5MP2
S3
A5R2
A5S1
A5R1
R7
A13(A14)
T1
A12
Q1
C3
K2
(A6)
MP19
K1
R3
S2
R10(S5)
(S1)
R9
R5
R4

Figure 5-3. Type RS-111-1B-12 Receiving System, Top View

Ref Desig	Description	Qty Per Assy	Vendor Part No.	Vendor Code
J1	CONNECTOR, JACK, N SERIES Part of W16	2	UG-1052/U	81349
J2	Same as J1 Part of W5			
J3	CONNECTOR, RECEPTACLE, BNC SERIES Part of W12	4	17825	74868
J4	Same as J3			
J5	Same as J3			
J6	CONNECTOR, RECEPTACLE, MULTIPIN	1	MRE-14SG7	81312
J7	CONNECTOR, RECEPTACLE, MULTIPIN	1	MRE-18SG7	81312
J8	CONNECTOR, RECEPTACLE, MULTIPIN	1	MRE-7-2SG7	81312
J9	CONNECTOR, RECEPTACLE, MULTIPIN	1	MRE-9SG7	81312
J10	CONNECTOR, JACK, TELEPHONE	1	L11	82389
J11	CONNECTOR, RECEPTACLE, BNC SERIES Part of K1	--		
J12	CONNECTOR, RECEPTACLE, BNC SERIES Part of K1	--		
J13	CONNECTOR, RECEPTACLE, BNC SERIES Part of K1	--		
J14	CONNECTOR, RECEPTACLE, BNC SERIES Part of K2	--		
J15	CONNECTOR, RECEPTACLE, BNC SERIES Part of K2	--		
J16	CONNECTOR, RECEPTACLE, BNC SERIES Part of K2	--		
J17	Same as J3			
K1	RELAY	2	318-10382-3	74868
K2	Same as K1			
M1	METER, SIGNAL STRENGTH	1	1632	14632
MP1	CRANK ASSEMBLY	4	1914-1	14632
MP2	Same as MP1			
MP3	Same as MP1			
MP4	Same as MP1			
MP5	KNOB	5	1073-6	14632
MP6	Same as MP5			
MP7	Same as MP5			
MP8	Same as MP5			
MP9	Same as MP5			
MP10	KNOB	1	G50-2-1	94144
MP11	KNOB	7	1073-1	14632
MP12	Same as MP11			
MP13	Same as MP11			
MP14	Same as MP11			

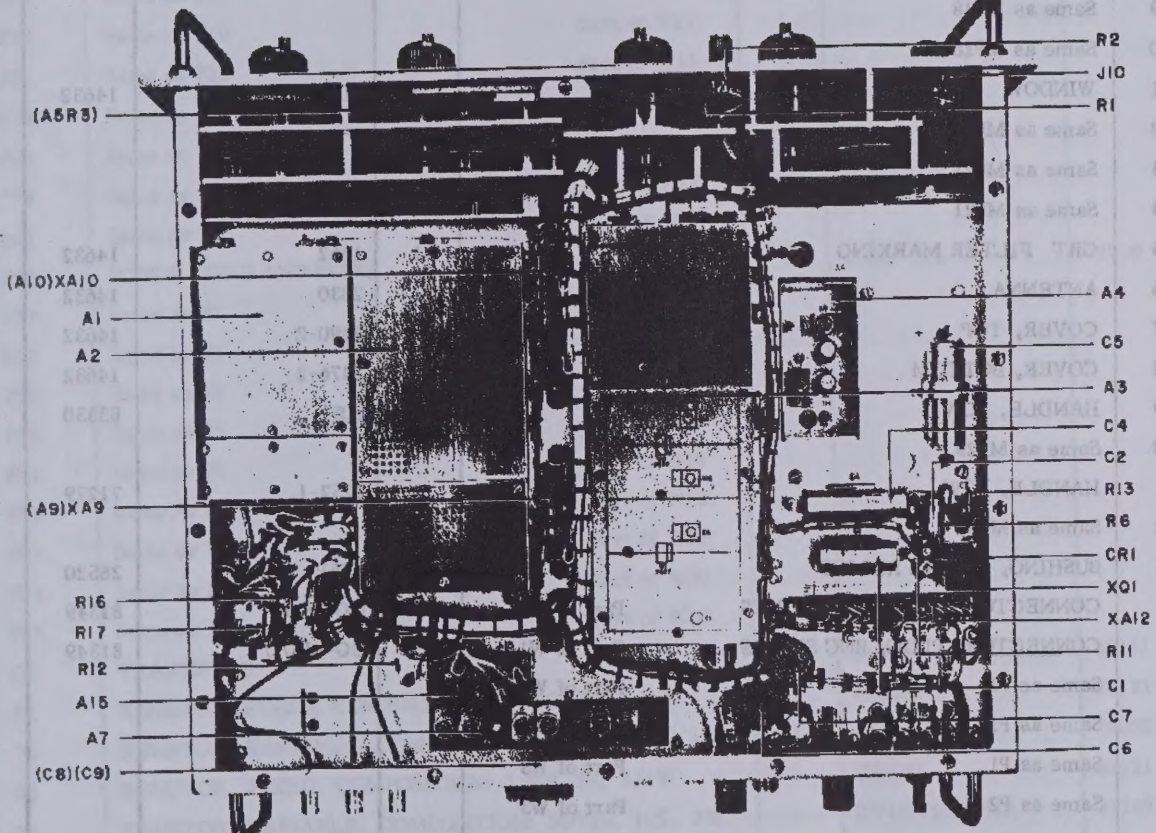

R2
J10
R1
(A5R5)
(A10)XA10
A1
A2
A4
C5
A3
C4
C2
R13
R6
CR1
(A9)XA9
XO1
XA12
R16
R17
R12
R11
C1
A15
C7
A7
C6
(C8)(C9)

Figure 5-4. Type RS-111-1B-12 Receiving System, Bottom View

Ref Desig	Description	Qty Per Assy	Vendor Part No.	Vendor Code
MP15	Same as MP11			
MP16	Same as MP11			
MP17	Same as MP11			
MP18	COUPLING, FLEXIBLE	3	FC-9	18469
MP19	Same as MP18			
MP20	Same as MP18			
MP21	WINDOW	4	1052	14632
MP22	Same as MP21			
MP23	Same as MP21			
MP24	Same as MP21			
MP25	CRT FILTER MARKING	1	1662	14632
MP26	ANTENNA	1	2830	14632
MP27	COVER, TOP	1	2490-2	14632
MP28	COVER, BOTTOM	1	2476-2	14632
MP29	HANDLE, BOW	2	2051	83330
MP30	Same as MP29			
MP31	HANDLE, BOW	2	1252-1	71279
MP32	Same as MP31			
MP33	BUSHING, STRAIN RELIEF	1	SR5P	28520
P1	CONNECTOR, PLUG, BNC SERIES Part of W1	15	UG-88/U	81349
P2	CONNECTOR, PLUG, BNC SERIES Part of W1	3	UG-913/U	81349
P3	Same as P1 Part of W2			
P4	Same as P1 Part of W2			
P5	Same as P1 Part of W3			
P6	Same as P2 Part of W3			
P7	Same as P1 Part of W4			
P8	Same as P1 Part of W4			
P9	Same as P1 Part of W5			
P10	CONNECTOR, PLUG, SUBMINIATURE SERIES Part of W7	9	UG-1466/U	81349
P11	Same as P10 Part of W7			
P12	Same as P10 Part of W10			
P13	CONNECTOR, PLUG, SUBMINIATURE Part of W10	7	27-7	74868
P14	Same as P13 Part of W6			
P15	Same as P13 Part of W6			

Ref Desig	Description	Qty Per Assy	Vendor Part No.	Vendor Code
P16	Same as P10 Part of W8			
P17	Same as P13 Part of W8			
P18	Same as P13 Part of W9			
P19	Same as P13 Part of W9			
P20	Same as P10 Part of W11			
P21	Same as P10 Part of W11			
P22	Same as P13 Part of W14			
P23	Same as P10 Part of W14			
P24	Same as P1 Part of W17			
P25	Same as P1 Part of W17			
P26	POWER CORD AND PLUG	1	01753-001	71700
P27	Same as P1 Part of W18			
P28	Same as P1 Part of W18			
P29	Same as P1 Part of W19			
P30	Same as P1 Part of W19			
P31	Same as P1 Part of W16			
P32	Same as P10 Part of W12			
P33	Same as P10 Part of W13			
P34	Same as P2 Part of W20			
P35	Same as P1 Part of W20			
Q1	TRANSISTOR	1	2N1544	80131
R1	RESISTOR, FIXED, COMPOSITION: 51 kΩ, 5%, 1/4W	2	CB5135	01121
R2	RESISTOR, VARIABLE, COMPOSITION: 100 kΩ, 10%, 1/4W	1	70-08460	76055
R3	RESISTOR, FIXED, COMPOSITION: 1 MΩ, 5%, 1/4W	1	CB1055	01121
R4	RESISTOR, VARIABLE, COMPOSITION: 500 kΩ, 10%, 2W	1	RV4NAYSD504A	81349
R5	RESISTOR, FIXED, COMPOSITION: 180 kΩ, 5%, 1/4W	1	CB1845	01121
R6	RESISTOR, FIXED, COMPOSITION: 150 Ω, 5%, 1/4W	2	CB1515	01121
R7	RESISTOR, VARIABLE, COMPOSITION: 10 kΩ, 10%, 2W (CW-LOG)	1	RV4NAYSD103C	81349
R8	NOT USED			
R9	RESISTOR, VARIABLE, COMPOSITION: 10 kΩ, 10%, 1/4W	1	70-08461	76055
R10	RESISTOR, VARIABLE, COMPOSITION: 100 kΩ, 10%, 2W (w/switch)	1	RV4NBYSD104A	81349
R11	Same as R6			
R12	RESISTOR, FIXED, COMPOSITION: 240 kΩ, 5%, 1/4W	1	CB2445	01121

Ref Desig	Description	Qty Per Assy	Vendor Part No.	Vendor Code
R13	RESISTOR, FIXED, COMPOSITION: 470 Ω, 5%, 2W	1	HB4715	01121
R14	RESISTOR, FIXED, COMPOSITION: 22 kΩ, 5%, 1/4W	1	CB2235	01121
R15	RESISTOR, FIXED, COMPOSITION: 62 kΩ, 5%, 1/4W	1	CB6235	01121
R16	RESISTOR, FIXED, COMPOSITION: 100 kΩ, 5%, 1/4W	1	CB1045	01121
R17	RESISTOR, FIXED, COMPOSITION: 10 kΩ, 5%, 1/4W	1	CB1035	01121
S1	SWITCH, ROTARY: 2 section, 4 pole, 2-6 position	2	1128-03	14632
S2	Same as S1			
S3	SWITCH, ROTARY: 1 section, 1 pole, 2-12 position	1	1128-22	14632
S4	SWITCH, SLIDE: DPDT	1	11A-1009	82389
S5	SWITCH, SPST Part of R10	--		
T1	TRANSFORMER	1	10775	14632
TB1	TERMINAL BOARD	1	353-18-02-001	71785
W1	CABLE AND CONNECTOR ASSEMBLY	1	2126-235	14632
W2	CABLE AND CONNECTOR ASSEMBLY	1	2126-236	14632
W3	CABLE AND CONNECTOR ASSEMBLY	1	2126-237	14632
W4	CABLE AND CONNECTOR ASSEMBLY	1	2126-238	14632
W5	CABLE AND CONNECTOR ASSEMBLY	1	2126-239	14632
W6	CABLE AND CONNECTOR ASSEMBLY	1	2126-240	14632
W7	CABLE AND CONNECTOR ASSEMBLY	1	2126-241	14632
W8	CABLE AND CONNECTOR ASSEMBLY	1	2126-242	14632
W9	CABLE AND CONNECTOR ASSEMBLY	1	2126-243	14632
W10	CABLE AND CONNECTOR ASSEMBLY	1	2126-244	14632
W11	CABLE AND CONNECTOR ASSEMBLY	1	2126-245	14632
W12	CABLE AND CONNECTOR ASSEMBLY	1	2126-246	14632
W13	CABLE AND CONNECTOR ASSEMBLY	1	2126-247	14632
W14	CABLE AND CONNECTOR ASSEMBLY	1	2126-248	14632
W15	NOT USED			
W16	CABLE AND CONNECTOR ASSEMBLY	1	2126-249	14632
W17	CABLE AND CONNECTOR ASSEMBLY	1	2126-250	14632
W18	CABLE AND CONNECTOR ASSEMBLY	1	2126-251	14632
W19	CABLE AND CONNECTOR ASSEMBLY	1	2126-252	14632
W20	CABLE AND CONNECTOR ASSEMBLY	1	2126-253	14632
XA9	CONNECTOR, P. C. CARD	1	00-5002-008-103-002	91662
XA10	CONNECTOR, P. C. CARD	1	00-5002-013-103-002	91662

Ref Desig	Description	Qty Per Assy	Vendor Part No.	Vendor Code
XA12	CONNECTOR, P. C. CARD	1	00-5002-018-103-002	91662
XDS1	LAMPHOLDER	4	7-02	95263
XDS2	Same as XDS1			
XDS3	Same as XDS1			
XDS4	Same as XDS1			
XF1	FUSEHOLDER	2	HKP	71400
XF2	Same as XF1			
XQ1	SOCKET, TRANSISTOR	1	8038-1G1	91506

5.4.2 Type 7165 30-60 MC Tuner

REF DESIG PREFIX A1

Ref Desig	Description	Qty Per Assy	Vendor Part No.	Vendor Code
C1	CAPACITOR, FIXED MICA: 15 pF, ±5%, 500V	1	DM10-150J	72136
C2	CAPACITOR, FIXED MICA: 22 pF, ±5%, 500V	2	DM10-220J	72136
C3	CAPACITOR, VARIABLE, TRIMMER: 0.7-9.0 pF	4	VC26G	73899
C4	CAPACITOR, FIXED, MICA: 270 pF, ±5%, 500V	2	DM15-271J	72136
C5	CAPACITOR, FIXED, DISC, CERAMIC: 1000pF, GMV, 500V	15	SM(.001 μF, GMV)	91418
C6	CAPACITOR, FIXED, COMPOSITION, TUBULAR: 0.33 pF, ± 10%, 500V	1	QC(.33 pF, 10%)	95121
C7	CAPACITOR, FIXED, CERAMIC, TUBULAR: 1.5 pF, ±.25pF 500V	1	301-000-COKO-159C	72982
C8	Same as C5			
C9	Same as C5			
C10	Same as C5			
C11	Same as C4			
C12	CAPACITOR, FIXED MICA: 18 pF, ±5%, 500V	1	DM10-180J	72136
C13	Same as C3			
C14	CAPACITOR, FIXED, CERAMIC, TUBULAR; 2.2 pF, ±.25pF 500V	1	301-000-COJO-229C	72982
C15	Same as C3			
C16	CAPACITOR, FIXED MICA: 12 pF, ±5%, 500V	2	DM10-120J	72136
C17	CAPACITOR, FIXED MICA: 47 pF, ±5%, 500V	1	DM10-470J	72136
C18	CAPACITOR, FIXED, CERAMIC, TUBULAR: 1.2 pF, ±.25pF 500V	1	301-000-COKO-129C	72982
C19	Same as C5			
C20	Same as C5			
C21	CAPACITOR, FIXED, CERAMIC, STANDOFF: 1000 pF, GMV 500V	2	SS5A-102W	01121
C22	CAPACITOR, FIXED, CERAMIC, FEEDTHRU: 330 pF, 10% 500V	1	FA5C-3311	01121
C23	Same as C5			
C24	Same as C5			
C25	Same as C21			
C26	Same as C5			
C27	Same as C3			
C28	CAPACITOR, FIXED MICA: 10 pF, ±5%, 500V	2	DM10-100J	72136
C29	Same as C2			
C30	Same as C28			

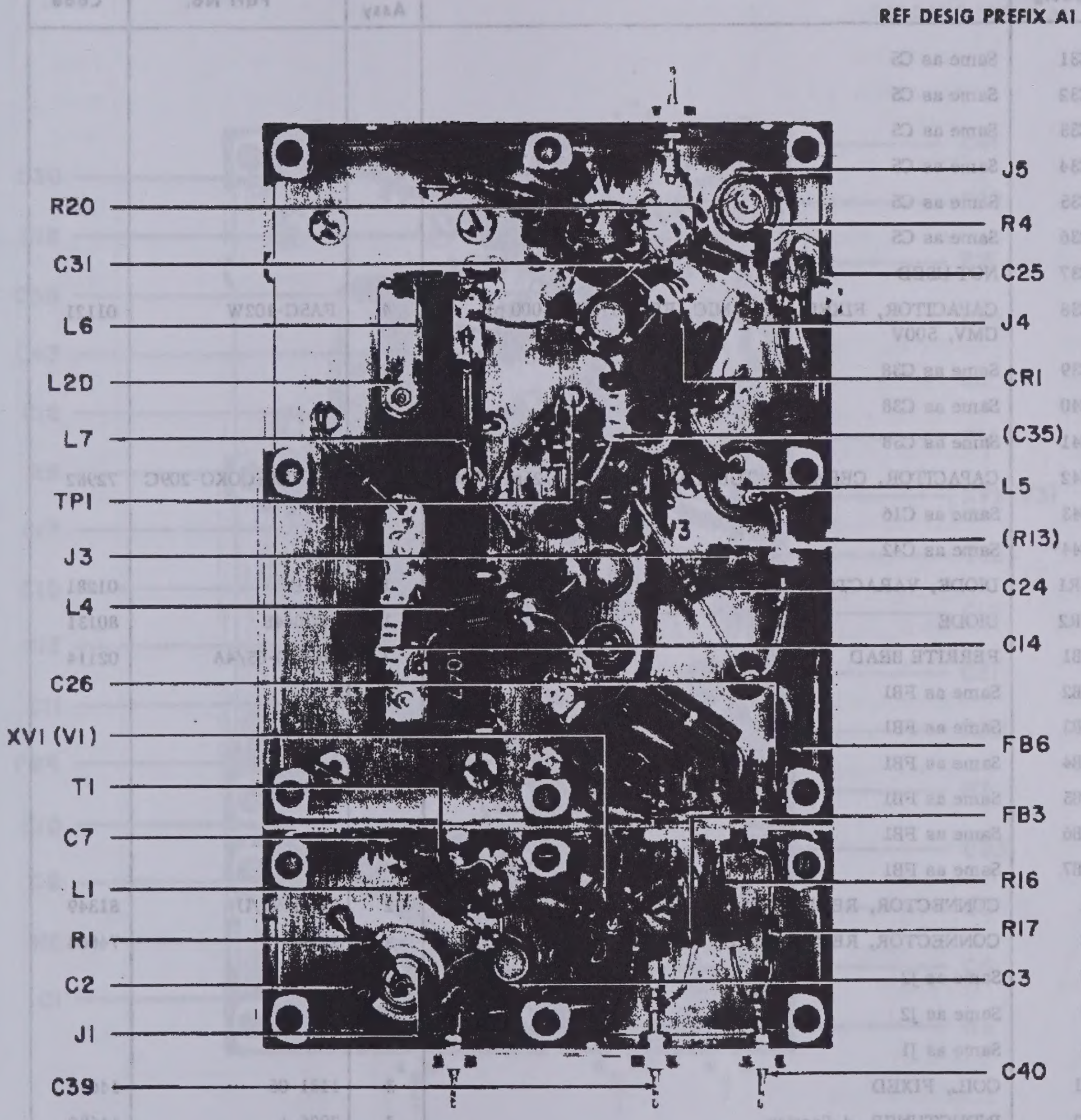

REF DESIG PREFIX A1
R20
C31
L6
L2D
L7
TP1
J3
L4
C26
XV1 (V1)
T1
C7
L1
R1
C2
J1
C39
J5
R4
C25
J4
CR1
(C35)
L5
(R13)
C24
C14
FB6
FB3
R16
R17
C3
C40

Figure 5-5. Type 7165 30-60 MC Tuner, Component Locations

REF DESIG PREFIX A1

Ref Desig	Description	Qty Per Assy	Vendor Part No.	Vendor Code
C31	Same as C5			
C32	Same as C5			
C33	Same as C5			
C34	Same as C5			
C35	Same as C5			
C36	Same as C5			
C37	NOT USED			
C38	CAPACITOR, FIXED, CERAMIC, FEEDTHRU: 1000 pF, GMV, 500V	4	FA5C-102W	01121
C39	Same as C38			
C40	Same as C38			
C41	Same as C38			
C42	CAPACITOR, CERAMIC, TUBULAR: 2.0 pF, ±.25pF, 500V	2	301-000-COKO-209C	72982
C43	Same as C16			
C44*	Same as C42			
CR1	DIODE, VARACTOR	1	V27E	01281
CR2	DIODE	1	1N3044B	80131
FB1	FERRITE BEAD	7	56-590-65/4A	02114
FB2	Same as FB1			
FB3	Same as FB1			
FB4	Same as FB1			
FB5	Same as FB1			
FB6	Same as FB1			
FB7	Same as FB1			
J1	CONNECTOR, RECEPTACLE, BNC	2	UG-1094/U	81349
J2	CONNECTOR, RECEPTACLE, SUB-MINIATURE	3	27-9	74868
J3	Same as J2			
J4	Same as J2			
J5	Same as J1			
L1	COIL, FIXED	3	1131-06	14632
L2	INDUCTUNER, 4-Section	1	2026-1	14632
L3	Same as L1			
L4	Same as L1			
L5	COIL, ADJUSTABLE	1	1472-3	14632
L6	COIL, FIXED	1	1131-07	14632

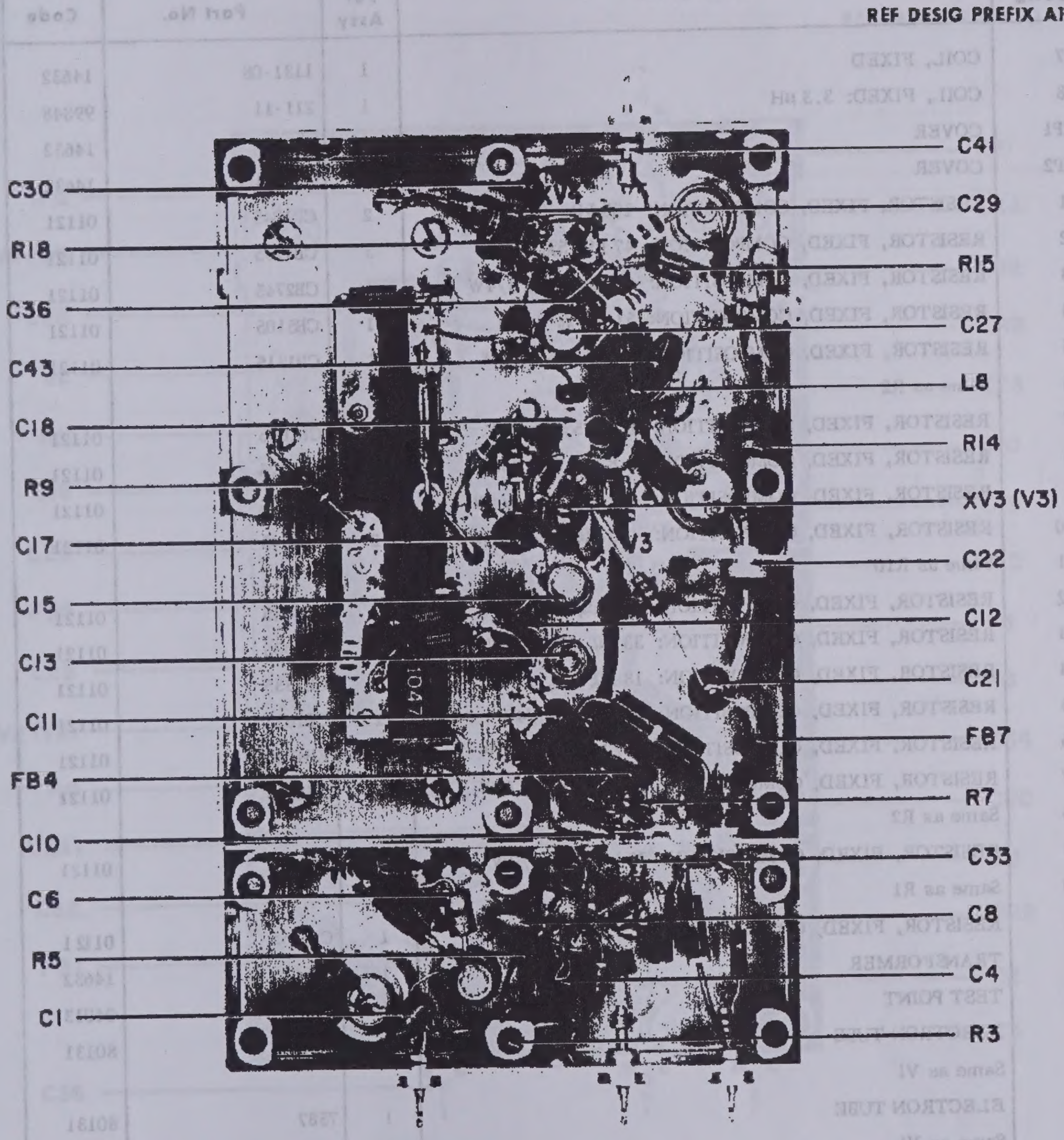

REF DESIG PREFIX A1
C30
R18
C36
C43
C18
R9
C17
C15
C13
C11
FB4
C10
C6
R5
C1
C41
C29
R15
C27
L8
R14
XV3 (V3)
V3
C22
C12
C21
FB7
R7
C33
C8
C4
R3
1047

Figure 5-6. Type 7165 30-60 MC Tuner, Component Locations

REF DESIG PREFIX A1

Ref Desig	Description	Qty Per Assy	Vendor Part No.	Vendor Code
L7	COIL, FIXED	1	1131-08	14632
L8	COIL, FIXED: 3.3 μH	1	211-11	99848
MP1	COVER	1	1051	14632
MP2	COVER	1	2009-3	14632
R1	RESISTOR, FIXED, COMPOSITION: 100 kΩ, 5%, 1/4W	2	CB1045	01121
R2	RESISTOR, FIXED, COMPOSITION: 47 kΩ, 5%, 1/4W	3	CB4735	01121
R3	RESISTOR, FIXED, COMPOSITION: 270 kΩ, 5%, 1/4W	1	CB2745	01121
R4	RESISTOR, FIXED, COMPOSITION: 51 Ω, 5%, 1/4W	1	CB5105	01121
R5	RESISTOR, FIXED, COMPOSITION: 150 Ω, 5%, 1/4W	1	CB1515	01121
R6	Same as R2			
R7	RESISTOR, FIXED, COMPOSITION: 10 Ω, 5%, 1/4W	1	CB1005	01121
R8	RESISTOR, FIXED, COMPOSITION: 6.8 kΩ, 5%, 1W	1	GB6825	01121
R9	RESISTOR, FIXED, COMPOSITION: 4.7 kΩ, 5%, 1/4W	1	CB4725	01121
R10	RESISTOR, FIXED, COMPOSITION: 470 kΩ, 5%, 1/4W	2	CB4745	01121
R11	Same as R10			
R12	RESISTOR, FIXED, COMPOSITION: 330 kΩ, 5%, 1/4W	1	CB3345	01121
R13	RESISTOR, FIXED, COMPOSITION: 33 kΩ, 5%, 1/4W	1	CB3335	01121
R14	RESISTOR, FIXED, COMPOSITION: 13 kΩ, 5%, 1W	1	GB1335	01121
R15	RESISTOR, FIXED, COMPOSITION: 1 kΩ, 5%, 1/4W	1	CB1025	01121
R16	RESISTOR, FIXED, COMPOSITION: 4.7 kΩ, 5%, 1/2W	1	EB4725	01121
R17	RESISTOR, FIXED, COMPOSITION: 2.2 kΩ, 5%, 1/4W	1	CB2225	01121
R18	Same as R2			
R19	RESISTOR, FIXED, COMPOSITION: 22 kΩ, 5%, 1/2W	1	EB2235	01121
R20	Same as R1			
R21	RESISTOR, FIXED, COMPOSITION: 1.5 MΩ, 5%, 1/4W	1	CB1555	01121
T1	TRANSFORMER	1	1134	14632
TP1	TEST POINT	1	TJ6	04013
V1	ELECTRON TUBE	3	6CW4	80131
V2	Same as V1			
V3	ELECTRON TUBE	1	7587	80131
V4	Same as V1			
XV1	SOCKET, ELECTRON TUBE	4	133-65-10-001	71785
XV2	Same as XV1			
XV3	Same as XV1			

REF DESIG PREFIX A1

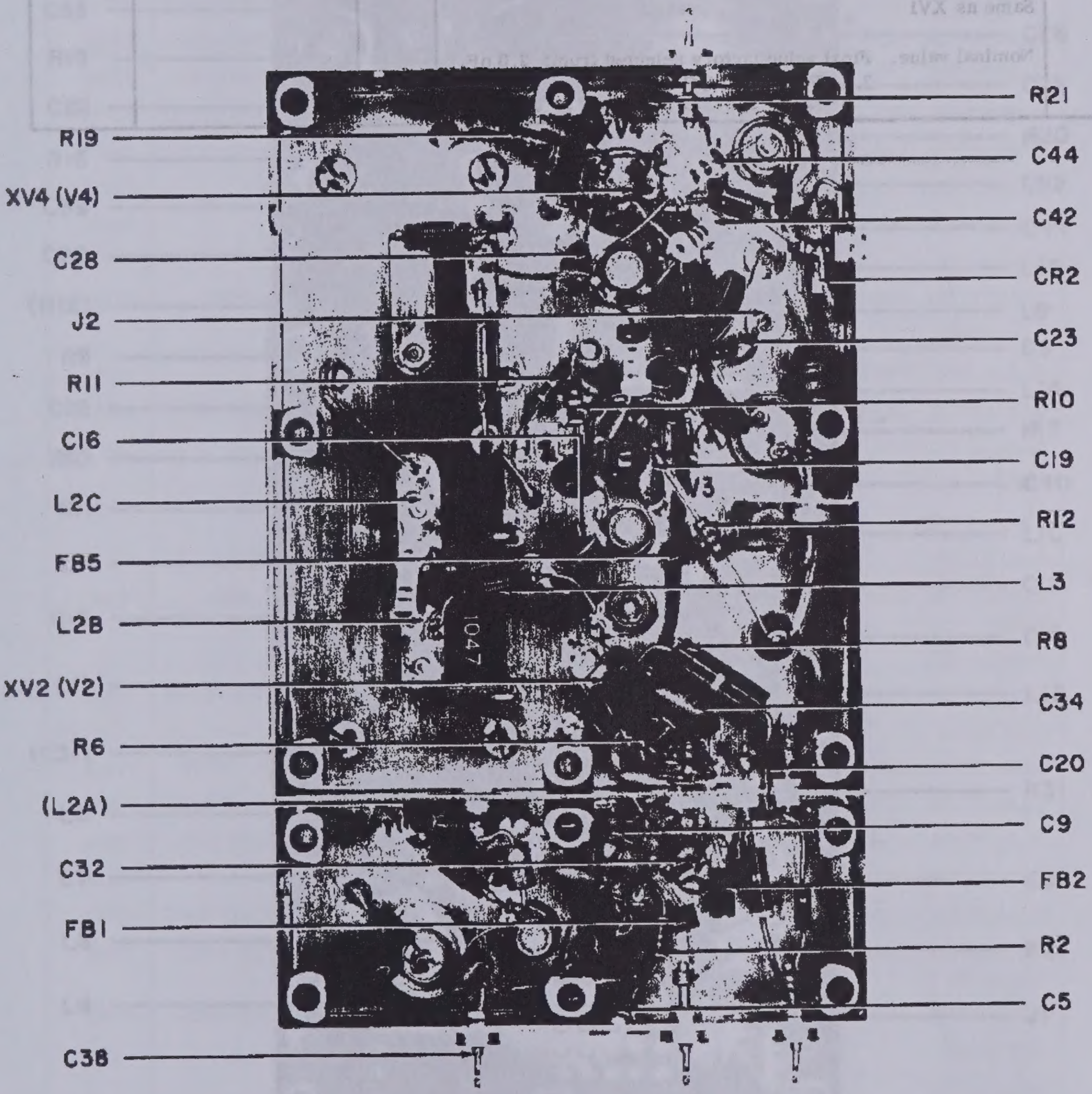

R19
XV4 (V4)
C28
J2
R11
C16
L2C
FB5
L2B
XV2 (V2)
R6
(L2A)
C32
FB1
C38
R21
C44
C42
CR2
C23
R10
C19
V3
R12
L3
R8
C34
C20
C9
FB2
R2
C5
1047

Figure 5-7. Type 7165 30-60 MC Tuner, Component Locations

REF DESIG PREFIX A1

Ref Desig	Description	Qty Per Assy	Vendor Part No.	Vendor Code
XV4	Same as XV1			
*	Nominal value. Final value factory selected from: 2.0 pF, 2.4 pF, 2.7 pF; TC-NPO			

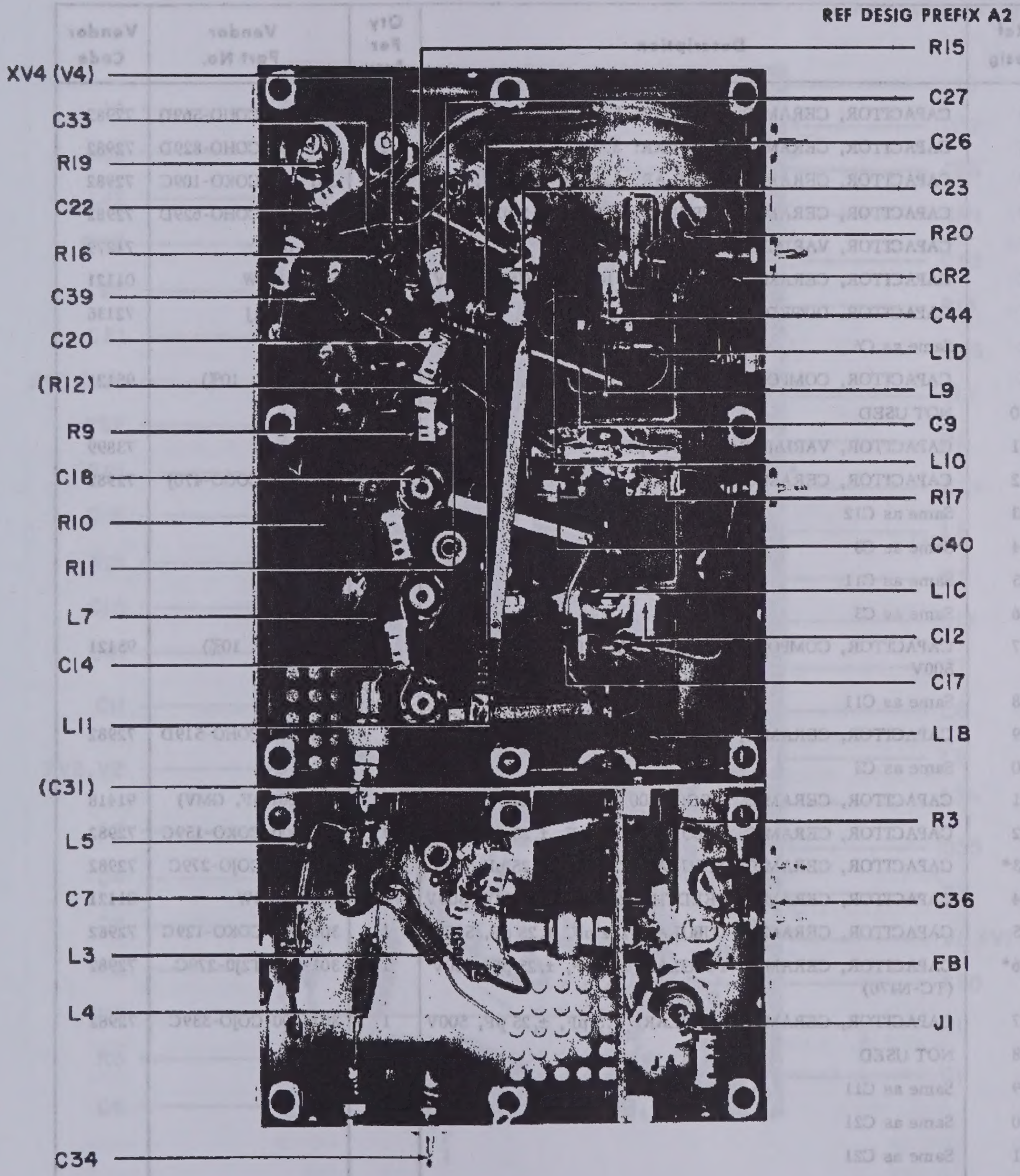

REF DESIG PREFIX A2
XV4 (V4)
C33
R19
C22
R16
C39
C20
(R12)
R9
C18
R10
R11
L7
C14
L11
(C31)
L5
C7
L3
L4
C34
R15
C27
C26
C23
R20
CR2
C44
L1D
L9
C9
L10
R17
C40
L1C
C12
C17
L1B
R3
C36
FB1
J1

Figure 5-8. Type 7164 60-300 MC Tuner, Component Locations

5.4.3 Type 7164 60-300 MC Tuner

REF DESIG PREFIX A2

Ref Desig	Description	Qty Per Assy	Vendor Part No.	Vendor Code
C1	CAPACITOR, CERAMIC, TUBULAR: 5.6 pF, ±0.5 pF, 500V	1	301-000-COHO-569D	72982
C2	CAPACITOR, CERAMIC, TUBULAR: 8.2 pF, ±0.5 pF, 500V	1	301-000-COHO-829D	72982
C3	CAPACITOR, CERAMIC, TUBULAR: 1.0 pF, ±.25 pF, 500V	4	301-000-COKO-109C	72982
C4	CAPACITOR, CERAMIC, TUBULAR: 6.2 pF, ±.5 pF, 500V	1	301-000-COHO-629D	72982
C5	CAPACITOR, VARIABLE: 0.5-4.5 pF	1	CST-6	71279
C6	CAPACITOR, CERAMIC, STANDOFF: 1000 pF, GMV, 500V	4	SS5A-102W	01121
C7	CAPACITOR, DIPPED MICA: 510 pF, ±5%, 500V	1	DM15-511J	72136
C8	Same as C6			
C9	CAPACITOR, COMPOSITION, TUBULAR: .47 pF, 10%, 500V	1	QC(.47pF, 10%)	95121
C10	NOT USED			
C11	CAPACITOR, VARIABLE: 0.7-9.0 pF	4	VC26G	73899
C12	CAPACITOR, CERAMIC, TUBULAR: 47 pF, ±5%, 500V	2	308-000-COGO-470J	72982
C13	Same as C12			
C14	Same as C3			
C15	Same as C11			
C16	Same as C3			
C17	CAPACITOR, COMPOSITION, TUBULAR: 0.22 pF, ± 10%, 500V	1	QC(.22pF, 10%)	95121
C18	Same as C11			
C19	CAPACITOR, CERAMIC, TUBULAR: 5.1 pF, ±.5 pF, 500V	1	301-000-COHO-519D	72982
C20	Same as C3			
C21	CAPACITOR, CERAMIC, DISC: 1000 pF, GMV, 500V	6	SM(.001 pF, GMV)	91418
C22	CAPACITOR, CERAMIC, TUBULAR: 1.5 pF, ±.25 pF, 500V	1	301-000-COKO-159C	72982
C23*	CAPACITOR, CERAMIC, TUBULAR: 2.7 pF, ±.25 pF, 500V	1	301-000-COJO-279C	72982
C24	CAPACITOR, CERAMIC, FEEDTHRU: 1000 pF, GMV, 500V	6	FA5C-102W	01121
C25	CAPACITOR, CERAMIC, TUBULAR: 1.2 pF, ±.25 pF, 500V	1	301-000-COKO-129C	72982
C26*	CAPACITOR, CERAMIC, TUBULAR: 2.7 pF, ±.25 pF, 500V (TC-N470)	1	301-000-T2J0-279C	72982
C27	CAPACITOR, CERAMIC, TUBULAR: 3.3 pF, ±.25 pF, 500V	1	301-000-COJO-339C	72982
C28	NOT USED			
C29	Same as C11			
C30	Same as C21			
C31	Same as C21			
C32	Same as C21			
C33	Same as C21			

* Factory selected value at time of alignment.

REF DESIG PREFIX A2

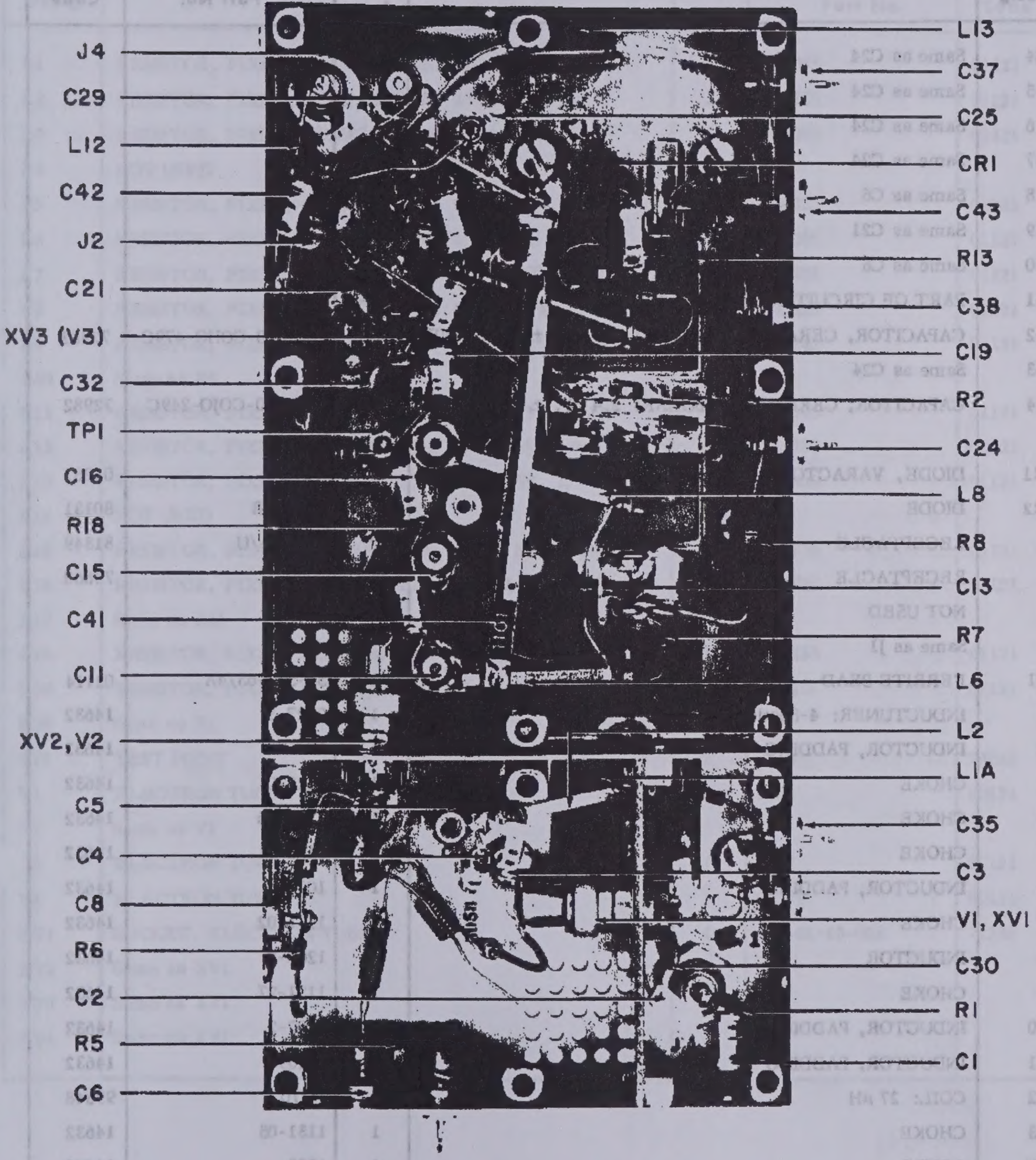

J4
C29
L12
C42
J2
C21
XV3 (V3)
C32
TP1
C16
R18
C15
C41
C11
XV2, V2
C5
C4
C8
R6
C2
R5
C6
L13
C37
C25
CR1
C43
R13
C38
C19
R2
C24
L8
R8
C13
R7
L6
L2
L1A
C35
C3
V1, XV1
C30
R1
C1

Figure 5-9. Type 7164 60-300 MC Tuner, Component Locations

REF DESIG PREFIX A2

Ref Desig	Description	Qty Per Assy	Vendor Part No.	Vendor Code
C34	Same as C24			
C35	Same as C24			
C36	Same as C24			
C37	Same as C24			
C38	Same as C6			
C39	Same as C21			
C40	Same as C6			
C41	PART OF CIRCUIT BOARD, CEI #1101	--		
C42	CAPACITOR, CERAMIC, TUBULAR: 4.7 pF, ±.25 pF, 500V	1	301-000-COHO-479C	72982
C43	Same as C24			
C44	CAPACITOR, CERAMIC, TUBULAR: 2.4 pF, ±.25 pF, 500V	1	301-000-COJO-249C	72982
CR1	DIODE, VARACTOR	1	V27E	01281
CR2	DIODE	1	1N3044B	80131
J1	RECEPTACLE	2	UG1094/U	81349
J2	RECEPTACLE	1	27-9	74868
J3	NOT USED			
J4	Same as J1			
FB1	FERRITE BEAD	1	56-590-65/4A	02114
L1	INDUCTUNER: 4-Section	1	2027-3	14632
L2	INDUCTOR, PADDING	1	10167	14632
L3	CHOKE	1	1129-01	14632
L4	CHOKE	1	1131-36	14632
L5	CHOKE	1	1131-01	14632
L6	INDUCTOR, PADDING	1	10166	14632
L7	CHOKE	1	1131-02	14632
L8	INDUCTOR	1	1200-2	14632
L9	CHOKE	1	1131-27	14632
L10	INDUCTOR, PADDING	1	1107-2	14632
L11	INDUCTOR, PADDING	1	10169	14632
L12	COIL: 27 μH	1	W270	99848
L13	CHOKE	1	1131-05	14632
MP1	COVER	1	1999	14632
MP2	COVER	1	2297	14632

REF DESIG PREFIX A2

Ref Desig	Description	Qty Per Assy	Vendor Part No.	Vendor Code
R1	RESISTOR, FIXED, COMPOSITION: 100 kΩ, 5%, 1/4W	2	CB1045	01121
R2	RESISTOR, FIXED, COMPOSITION: 13 kΩ, 5%, 1W	1	GB1335	01121
R3	RESISTOR, FIXED, COMPOSITION: 680 kΩ, 5%, 1/4W	1	CB6845	01121
R4	NOT USED			
R5	RESISTOR, FIXED, COMPOSITION: 6.2 kΩ, 5%, 2W	1	HB6225	01121
R6	RESISTOR, FIXED, COMPOSITION: 10 Ω, 5%, 1/4W	1	CB1005	01121
R7	RESISTOR, FIXED, COMPOSITION: 15 kΩ, 5%, 1/4W	1	CB1535	01121
R8	RESISTOR, FIXED, COMPOSITION: 6.8 kΩ, 5%, 2W	1	HB6825	01121
R9	RESISTOR, FIXED, COMPOSITION: 470 kΩ, 5%, 1/4W	2	CB4745	01121
R10	Same as R9			
R11	RESISTOR, FIXED, COMPOSITION: 330 kΩ, 5%, 1/4W	1	CB3345	01121
R12	RESISTOR, FIXED, COMPOSITION: 33 kΩ, 5%, 1/4W	1	CB3335	01121
R13	RESISTOR, FIXED, COMPOSITION: 10 kΩ, 5%, 1/2W	1	EB1035	01121
R14	NOT USED			
R15	RESISTOR, FIXED, COMPOSITION: 47 kΩ, 5%, 1/4W	1	CB4735	01121
R16	RESISTOR, FIXED, COMPOSITION: 4.7 kΩ, 5%, 1/4W	2	CB4725	01121
R17	Same as R16			
R18	RESISTOR, FIXED, COMPOSITION: 22 kΩ, 5%, 1/4W	1	CB2235	01121
R19	RESISTOR, FIXED, COMPOSITION: 51 Ω, 5%, 1/4W	1	CB5105	01121
R20	Same as R1			
TP1	TEST POINT	1	TJ-6	04013
V1	ELECTRON TUBE	2	8058	80131
V2	Same as V1			
V3	ELECTRON TUBE	1	7587	80131
V4	ELECTRON TUBE	1	6CW4	80131
XV1	SOCKET, ELECTRON TUBE	4	133-65-10-001	71785
XV2	Same as XV1			
XV3	Same as XV1			
XV4	Same as XV1			

5.4.4 Type 7162 235-500 MC RF Tuner

REF DESIG PREFIX A3

Ref Desig	Description	Qty Per Assy	Vendor Part No.	Vendor Code
C1	CAPACITOR, VARIABLE: 0.5-4.5 pF	1	CST-6	71279
C2	CAPACITOR, COMPOSITION, TUBULAR: 2.0 pF, ±10%, 500V	2	QC(2.0 pF, 10%)	95121
C3	CAPACITOR, STANDOFF: 470 pF, ±20%, 500V	7	SS5A-4712	01121
C4	Same as C3			
C5	CAPACITOR, FEEDTHRU: 470 pF, ±20%, 500V	17	FA5C-4712	01121
C6	CAPACITOR, VARIABLE: 0.8-4.5 pF	5	MG-1305	82872
C7	Same as C3			
C8	Same as C5			
C9	Same as C5			
C10	Same as C5			
C11	CAPACITOR, COMPOSITION, TUBULAR: 0.68 pF, ±10%, 500V	2	QC(.68 pF, 10%)	95121
C12	CAPACITOR, COMPOSITION, TUBULAR: 1.0 pF, ± 10%, 500V	2	MC(1.0 pF, 10%)	95121
C13	Same as C6			
C14	Same as C2			
C15	Same as C3			
C16	Same as C5			
C17	Same as C6			
C18	Same as C3			
C19	Same as C5			
C20	CAPACITOR, COMPOSITION, TUBULAR: 0.51 pF, ± 10% 500V	1	QC(.51 pF, 10%)	95121
C21	Same as C5			
C22	Same as C5			
C23	Same as C12			
C24	Same as C6			
C25	Same as C5			
C26	Same as C5			
C27	CAPACITOR, CERAMIC, TUBULAR: 2.7 pF, ± .25 pF, 500V	1	301-000-COJO-279C	72982
C28	CAPACITOR, COMPOSITION, TUBULAR: 1.8 pF, ± 10%, 500V	1	QC(1.8 pF, 10%)	95121
C29	Same as C3			
C30	CAPACITOR, CERAMIC, TUBULAR: 4.7 pF, ± .25 pF, 500V	1	301-000-COHO-479C	72982
C31	CAPACITOR, CERAMIC, DISC: 470 pF, ± 20%, 1000V	2	B(470 pF, 20%)	91418

REF DESIG PREFIX A3

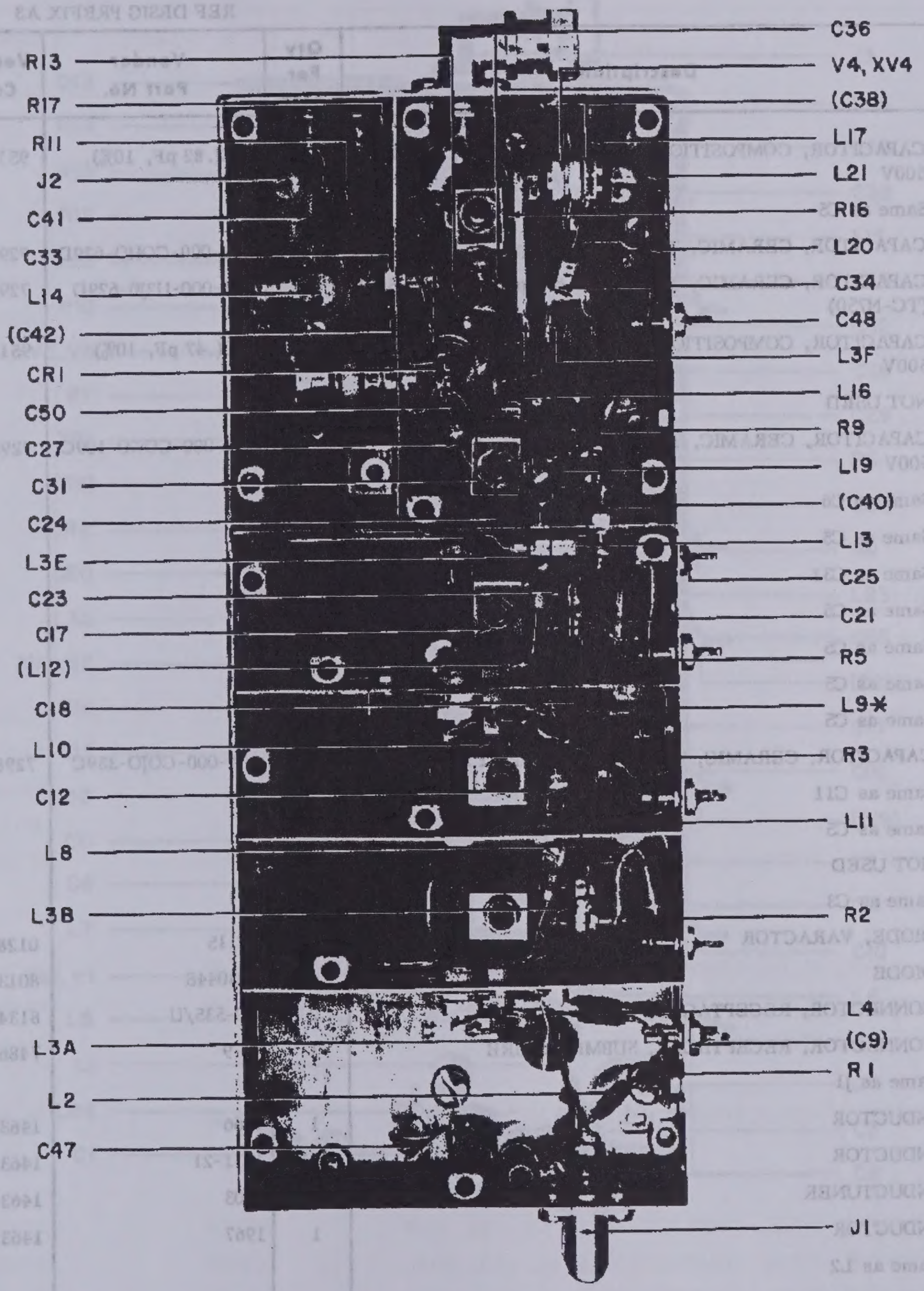

R13
R17
R11
J2
C41
C33
L14
(C42)
CR1
C50
C27
C31
C24
L3E
C23
C17
(L12)
C18
L10
C12
L8
L3B
L3A
L2
C47
C36
V4, XV4
(C38)
L17
L21
R16
L20
C34
C48
L3F
L16
R9
L19
(C40)
L13
C25
C21
R5
L9*
R3
L11
R2
L4
(C9)
R1
J1

Figure 5-10. Type 7162 235-500 MC Tuner, Component Locations

REF DESIG PREFIX A3

Ref Desig	Description	Qty Per Assy	Vendor Part No.	Vendor Code
C32	CAPACITOR, COMPOSITION, TUBULAR: .82 pF, ± 10%, 500V	1	MC(.82 pF, 10%)	95121
C33	Same as C5			
C34	CAPACITOR, CERAMIC, TUBULAR: 6.2 pF, ± .5 pF, 500V	1	301-000-COHO-629D	72982
C35	CAPACITOR, CERAMIC, TUBULAR: 6.2 pF, ± .5 pF, 500V (TC-N750)	1	301-000-U2J0-629D	72982
C36	CAPACITOR, COMPOSITION, TUBULAR: 0.47 pF, ± 10%, 500V	1	MC(.47 pF, 10%)	95121
C37	NOT USED			
C38	CAPACITOR, CERAMIC, TUBULAR: 1.0 pF, ± 0.25 pF, 500V	1	301-000-COKO-109C	72982
C39	Same as C6			
C40	Same as C5			
C41	Same as C31			
C42	Same as C5			
C43	Same as C5			
C44	Same as C5			
C45	Same as C5			
C46	CAPACITOR, CERAMIC, TUBULAR: 3.3 pF, ± .25 pF, 500V	1	301-000-COJO-339C	72982
C47	Same as C11			
C48	Same as C5			
C49	NOT USED			
C50	Same as C3			
CR1	DIODE, VARACTOR	1	PC115	01281
CR2	DIODE	1	1N3044B	80131
J1	CONNECTOR, RECEPTACLE, BNC	2	UG-535/U	81349
J2	CONNECTOR, RECEPTACLE, SUBMINIATURE	1	27-9	74868
J3	Same as J1			
L1	INDUCTOR	1	1966	14632
L2	INDUCTOR	11	1131-21	14632
L3	INDUCTUNER	1	2403	14632
L4	INDUCTOR	1	1967	14632
L5	Same as L2			
L6	Same as L2			
L7	INDUCTOR	1	1968	14632

REF DESIG PREFIX A3

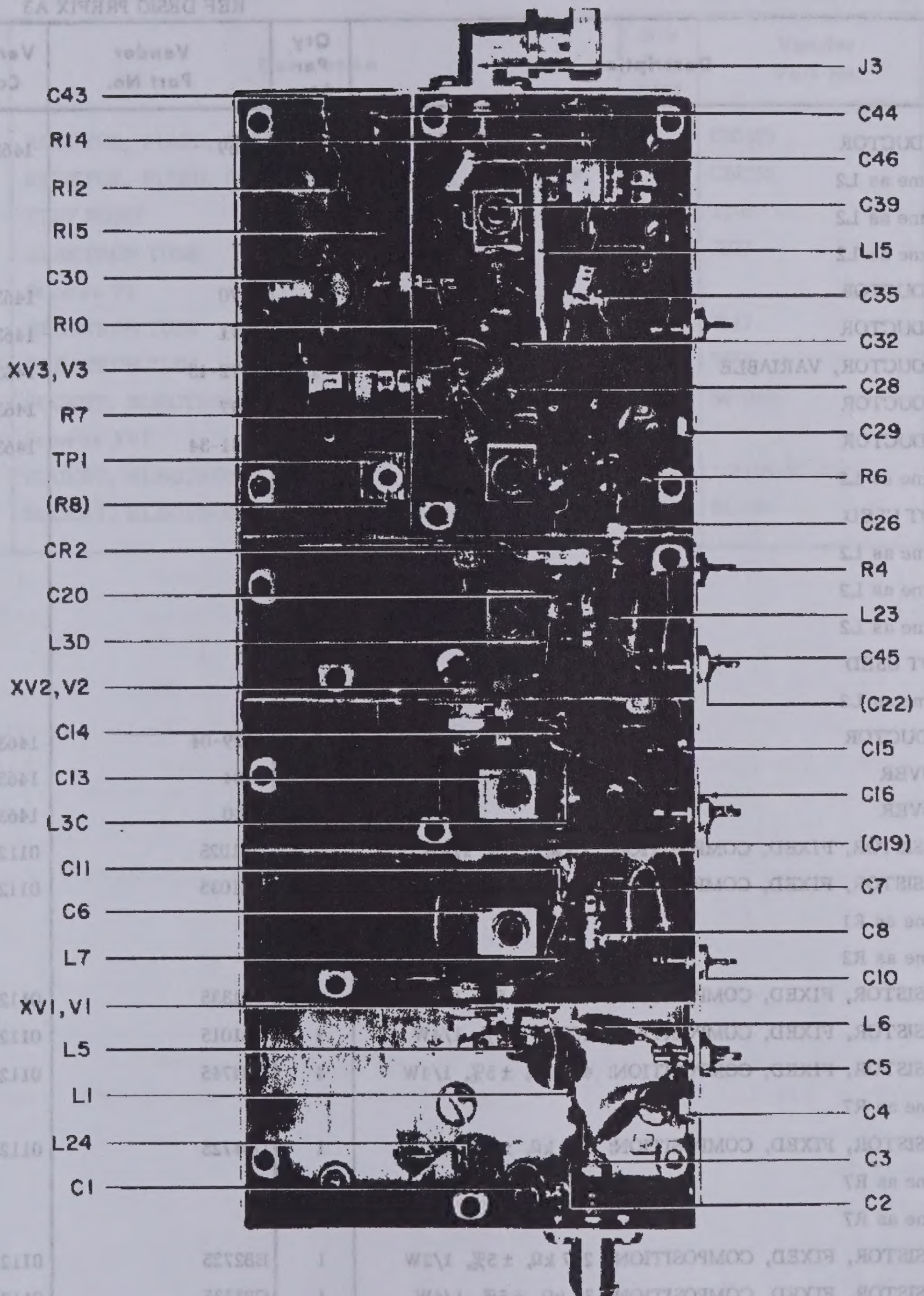

C43
R14
R12
R15
C30
R10
XV3, V3
R7
TP1
(R8)
CR2
C20
L3D
XV2, V2
C14
C13
L3C
C11
C6
L7
XV1, V1
L5
L1
L24
C1
J3
C44
C46
C39
L15
C35
C32
C28
C29
R6
C26
R4
L23
C45
(C22)
C15
C16
(C19)
C7
C8
C10
L6
C5
C4
C3
C2

Figure 5-11. Type 7162 235-500 MC Tuner, Component Locations

REF DESIG PREFIX A3

Ref Desig	Description	Qty Per Assy	Vendor Part No.	Vendor Code
L8	INDUCTOR	1	1969	14632
L9	Same as L2			
L10	Same as L2			
L11	Same as L2			
L12	INDUCTOR	1	1970	14632
L13	INDUCTOR	1	1971	14632
L14	INDUCTOR, VARIABLE	1	1472-13	14632
L15	INDUCTOR	1	1097	14632
L16	INDUCTOR	1	1131-34	14632
L17	Same as L2			
L18	NOT USED			
L19	Same as L2			
L20	Same as L2			
L21	Same as L2			
L22	NOT USED			
L23	Same as L2			
L24	INDUCTOR	1	1129-04	14632
MP1	COVER	1	2104	14632
MP2	COVER	1	2400	14632
R1	RESISTOR, FIXED, COMPOSITION: 1 kΩ, ±5%, 1/4W	2	CB1025	01121
R2	RESISTOR, FIXED, COMPOSITION: 10 kΩ, ±5%, 1W	2	GB1035	01121
R3	Same as R1			
R4	Same as R2			
R5	RESISTOR, FIXED, COMPOSITION: 13 kΩ, ±5%, 1W	1	GB1335	01121
R6	RESISTOR, FIXED, COMPOSITION: 100 Ω, ±5%, 1/4W	1	CB1015	01121
R7	RESISTOR, FIXED, COMPOSITION: 470 kΩ, ±5%, 1/4W	4	CB4745	01121
R8	Same as R7			
R9	RESISTOR, FIXED, COMPOSITION: 4.7 kΩ, ±5%, 1W	1	GB4725	01121
R10	Same as R7			
R11	Same as R7			
R12	RESISTOR, FIXED, COMPOSITION: 2.7 kΩ, ±5%, 1/2W	1	EB2725	01121
R13	RESISTOR, FIXED, COMPOSITION: 33 kΩ, ±5%, 1/4W	1	CB3335	01121
R14	RESISTOR, FIXED, COMPOSITION: 10 kΩ, ±5%, 1/4W	1	CB1035	01121
R15	RESISTOR, FIXED, COMPOSITION: 1.5 kΩ, ±5%, 1/4W	1	CB1525	01121

REF DESIG PREFIX A3

Ref Desig	Description	Qty Per Assy	Vendor Part No.	Vendor Code
R16	RESISTOR, FIXED, COMPOSITION: 51 Ω, ±5%, 1/4W	1	CB5105	01121
R17	RESISTOR, FIXED, COMPOSITION: 1.5 MΩ, ±5%, 1/4W	1	CB1555	01121
TP1	TEST POINT	1	TJ-6	04013
V1	ELECTRON TUBE	2	7077	80131
V2	Same as V1			
V3	ELECTRON TUBE	1	7587	80131
V4	ELECTRON TUBE	1	7486	80131
XV1	SOCKET, ELECTRON TUBE	2	86-040	04435
XV2	Same as XV1			
XV3	SOCKET, ELECTRON TUBE	1	133-65-10-001	71785
XV4	SOCKET, ELECTRON TUBE	1	86-085	04435

5.4.5 Type 7163 490-1000 MC Tuner

REF DESIG PREFIX A4

Ref Desig	Description	Qty Per Assy	Vendor Part No.	Vendor Code
C1A, B, C, D, E	CAPACITOR, TRIMMER	1	1271	14632
C2	CAPACITOR, VARIABLE, TUNING	4	1261	14632
C3	Same as C2			
C4	Same as C2			
C5	Same as C2			
C6	CAPACITOR, VARIABLE, TUNING	1	1276	14632
C7	CAPACITOR, CERAMIC, TRIMMER: 0.5-3 pF	1	3115-001-1R	72982
C8	CAPACITOR, CERAMIC, TUBULAR: 1.0 pF, ± 0.1 pF, 500V	1	301-000-COKO-109B	72982
C9	CAPACITOR, CERAMIC, TUBULAR: 1.5 pF, ±.25 pF, 500V	1	301-000-COKO-159C	72982
C10	CAPACITOR, FIXED: 0.27 pF, ± 10%, 500V	1	MC(0.27 pF, ±10%)	95121
C11	NOT USED			
C12	CAPACITOR, FEEDTHRU: 470 pF, ± 20%, 500V	6	FA5C-4712	01121
C13	CAPACITOR, STANDOFF: 137 pF, ± 20%, 500V	1	32-252394-1	54753
C14	Same as C12			
C15	CAPACITOR, SILVER MICA BUTTON: 15 pF, ± 10%	1	370-CB-150K	72982
C16	CAPACITOR, DIPPED MICA: 56 pF, ± 5%, 500V	1	DM10-560J	72136
C17	CAPACITOR, STANDOFF: 1000 pF, GMV, 500V	3	SS5A-102W	01121
C18	Same as C12			
C19	Same as C12			
C20	CAPACITOR, CERAMIC DISC: 1000 pF, GMV, 500V	6	SM(1000 pF, GMV)	91418
C21	Same as C20			
C22	Same as C20			
C23	Same as C20			
C24	Same as C17			
C25	CAPACITOR, CERAMIC, FEEDTHRU: 1000 pF, GMV, 500V	2	FA5C-102W	01121
C26	CAPACITOR, CERAMIC, TUBULAR: 2.2 pF, ±0.25 pF, 500V	1	301-000-COJO-229C	72982
C27	Same as C20			
C28	Same as C20			
C29	Same as C25			
C30	Same as C12			
C31	Same as C12			
C32	Same as C17			
CR1	DIODE, SILICON	1	1N82A	80131
CR2	DIODE, VARACTOR	1	PC-115	01281

REF DESIG PREFIX A4

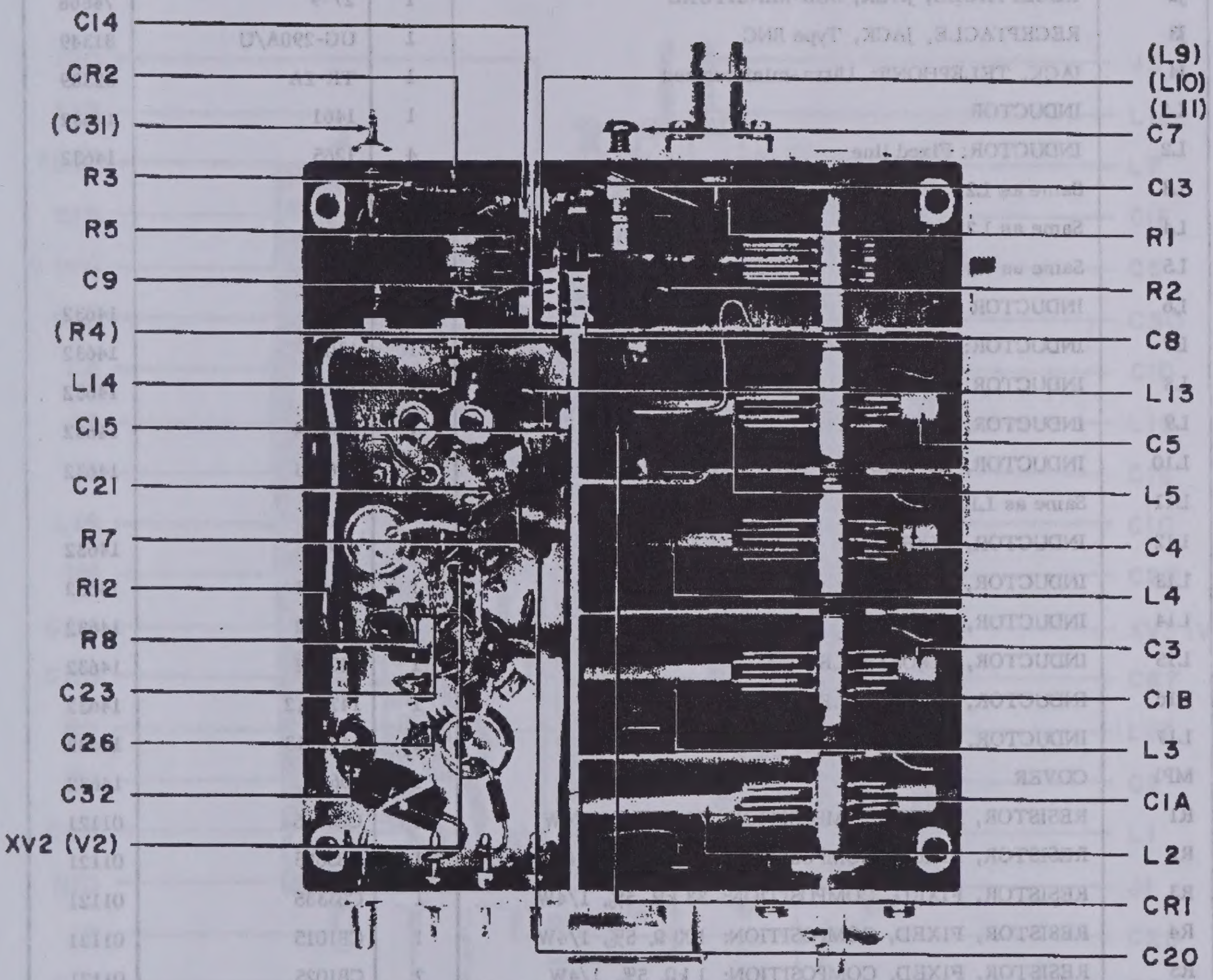

C14
CR2
(C31)
R3
R5
C9
(R4)
L14
C15
C21
R7
R12
R8
C23
C26
C32
XV2 (V2)
(L9)
(L10)
(L11)
C7
C13
R1
R2
C8
L13
C5
L5
C4
L4
C3
C1B
L3
C1A
L2
CR1
C20

Figure 5-12. Type 7163 490-1000 MC Tuner, Component Locations

]

REF DESIG PREFIX A4

Ref Desig	Description	Qty Per Assy	Vendor Part No.	Vendor Code
CR3	DIODE, ZENER	1	1N3044B	80131
J1	RECEPTACLE, JACK: Type BNC	1	UG-535/U	81349
J2	RECEPTACLE, JACK, SUB-MINIATURE	1	27-9	74868
J3	RECEPTACLE, JACK, Type BNC	1	UG-290A/U	81349
J4	JACK, TELEPHONE: Ultra-miniaturized	1	TR-2A	82389
L1	INDUCTOR	1	1461	14632
L2	INDUCTOR: Fixed line	4	1265	14632
L3	Same as L2			
L4	Same as L2			
L5	Same as L2			
L6	INDUCTOR	1	1462	14632
L7	INDUCTOR: Fixed line	1	1301	14632
L8	INDUCTOR	1	1973	14632
L9	INDUCTOR, RF CHOKE	1	1466-4	14632
L10	INDUCTOR, RF CHOKE	2	1466-3	14632
L11	Same as L10			
L12	INDUCTOR, FIXED	1	1975	14632
L13	INDUCTOR, FIXED	1	1466-1	14632
L14	INDUCTOR, FIXED	1	1466-2	14632
L15	INDUCTOR, ADJUSTABLE	1	1471-2	14632
L16	INDUCTOR, ADJUSTABLE	1	1472-12	14632
L17	INDUCTOR, ADJUSTABLE	1	1472-13	14632
MP1	COVER	1	2062	14632
R1	RESISTOR, FIXED, COMPOSITION: 51 Ω, 5%, 1/4W	1	CB5105	01121
R2	RESISTOR, FIXED, COMPOSITION: 5.6 kΩ, 5%, 1/4W	1	CB5625	01121
R3	RESISTOR, FIXED, COMPOSITION: 33 kΩ, 5%, 1/4W	1	CB3335	01121
R4	RESISTOR, FIXED, COMPOSITION: 100 Ω, 5%, 1/4W	1	CB1015	01121
R5	RESISTOR, FIXED, COMPOSITION: 1 kΩ, 5%, 1/4W	2	CB1025	01121
R6	RESISTOR, FIXED, COMPOSITION: 47 kΩ, 5%, 1/4W	2	CB4735	01121
R7	RESISTOR, FIXED, COMPOSITION: 68 Ω, 5%, 1/4W	1	CB6805	01121
R8	Same as R6			
R9	RESISTOR, FIXED, COMPOSITION: 10 Ω, 5%, 1/4W	1	CB1005	01121
R10	RESISTOR, FIXED, COMPOSITION: 2.7 kΩ, 5%, 1/4W	1	CB2725	01121
R11	RESISTOR, FIXED, COMPOSITION: 11 kΩ, 5%, 1W	1	GB1135	01121

REF DESIG PREFIX A4

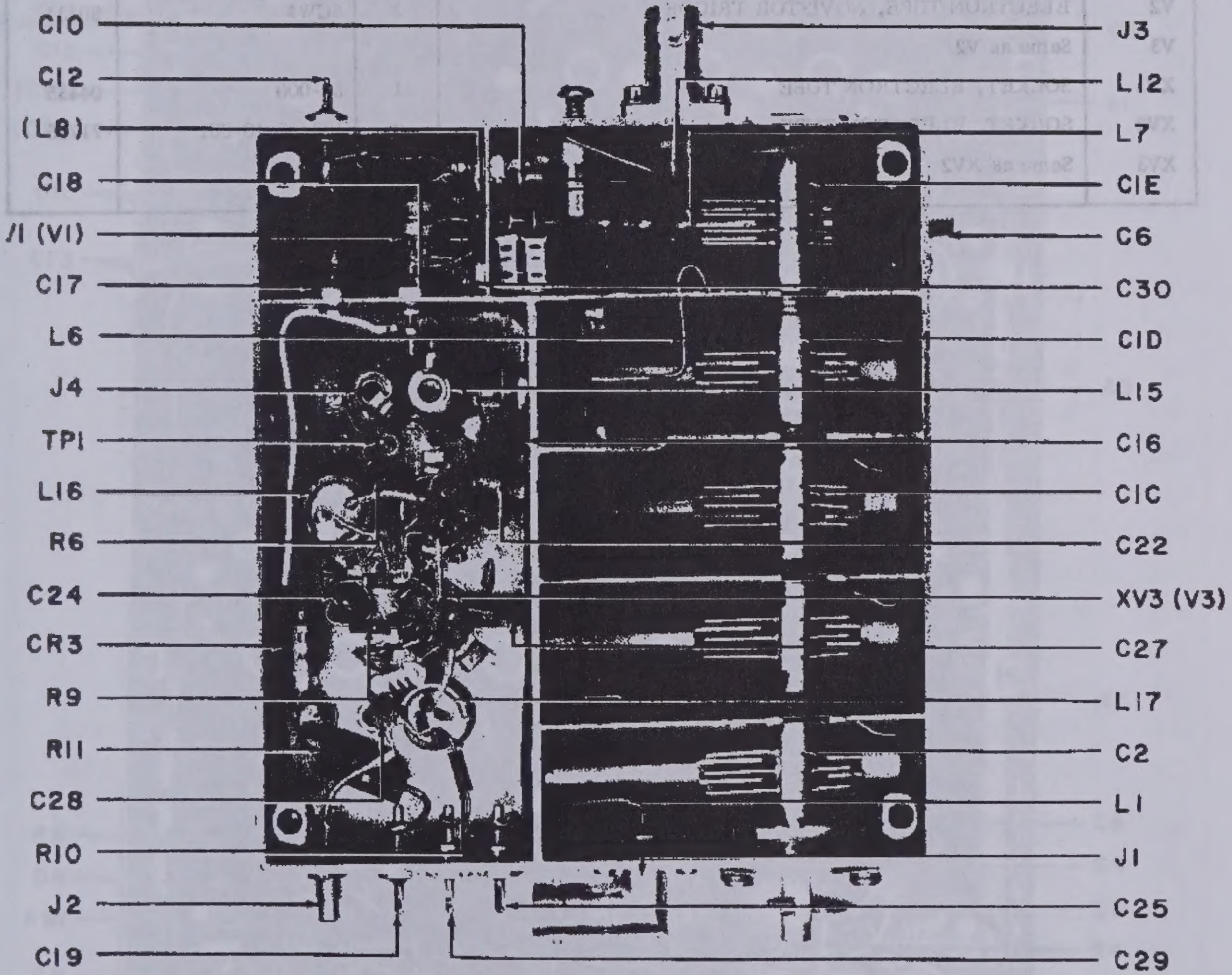

C10
C12
(L8)
C18
/1 (V1)
C17
L6
J4
TP1
L16
R6
C24
CR3
R9
R11
C28
R10
J2
C19
J3
L12
L7
C1E
C6
C30
C1D
L15
C16
C1C
C22
XV3 (V3)
C27
L17
C2
L1
J1
C25
C29

Figure 5-13. Type 7163 490-1000 MC Tuner, Component Locations

REF DESIG PREFIX A4

Ref Desig	Description	Qty Per Assy	Vendor Part No.	Vendor Code
R12	Same as R5			
TP1	TEST POINT	1	TJ-6	04013
V1	ELECTRON TUBE, CERAMIC TRIODE	1	7486	80131
V2	ELECTRON TUBE, NUVISTOR TRIODE	2	6CW4	80131
V3	Same as V2			
XV1	SOCKET, ELECTRON TUBE	1	86-000	04435
XV2	SOCKET, ELECTRON TUBE	2	133-65-10-001	71785
XV3	Same as XV2			

REF DESIG PREFIX A5

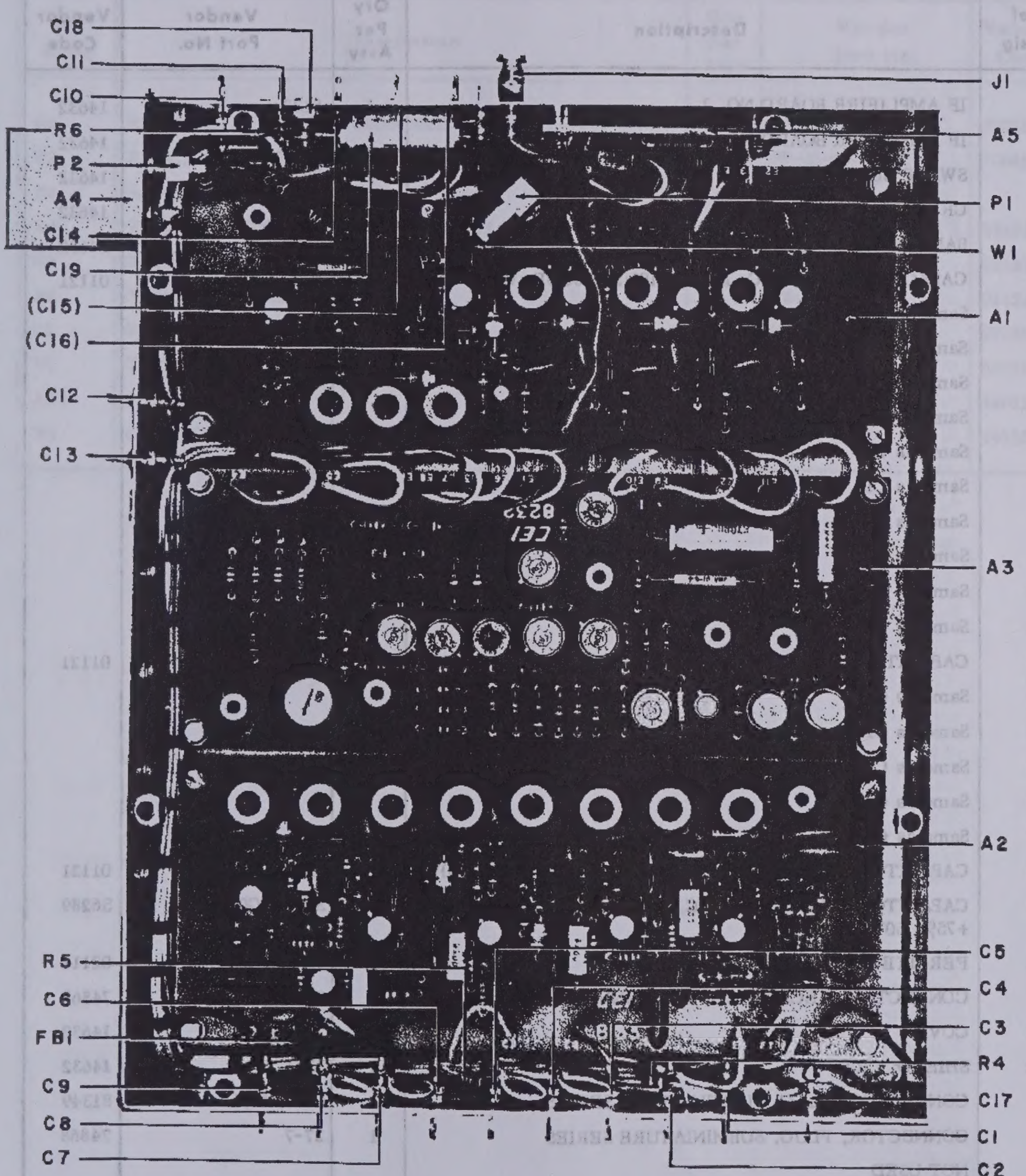

C18
C11
C10
R6
P2
A4
C14
C19
(C15)
(C16)
C12
C13
R5
C6
FB1
C9
C8
C7
J1
A5
P1
W1
A1
A3
A2
C5
C4
C3
R4
C17
C1
C2

Figure 5-14. Type 79358 Signal Monitor, Component Locations

5.4.6 Type 79358 Signal Monitor REF DESIG PREFIX A5

Ref Desig	Description	Qty Per Assy	Vendor Part No.	Vendor Code
A1	IF AMPLIFIER BOARD NO. 1	1	8132	14632
A2	IF AMPLIFIER BOARD NO. 2	1	8133	14632
A3	SWEEP GENERATOR	1	8232	14632
A4	CRYSTAL OSCILLATOR	1	8306	14632
A5	BANDPASS FILTER	1	79326	14632
C1	CAPACITOR, CERAMIC, FEEDTHRU: 1000 pF, GMV, 500V	13	FA5C-102W	01121
C2	Same as C1			
C3	Same as C1			
C4	Same as C1			
C5	Same as C1			
C6	Same as C1			
C7	Same as C1			
C8	Same as C1			
C9	Same as C1			
C10	Same as C1			
C11	Same as C1			
C12	CAPACITOR, CERAMIC, FEEDTHRU: 33 pF, 10%, 500V	4	FA5C-3301	01121
C13	Same as C12			
C14	Same as C12			
C15	Same as C12			
C16	Same as C1			
C17	Same as C1			
C18	CAPACITOR, CERAMIC STANDOFF: 1000 pF, GMV, 500V	1	SS5A-102W	01121
C19	CAPACITOR, ELECTROLYTIC, ALUMINUM: 50 μF, -10, +75%, 50V	1	30D506G050DD2	56289
FB1	FERRITE BEAD	1	56-590-65/4A	02114
J1	CONNECTOR, RECEPTACLE, SUBMINIATURE SERIES	1	27-9	74868
MP1	COVER	1	21529-1	14632
MP2	SHIELD, CRT	1	3374-2	14632
P1	CONNECTOR, PLUG, SUBMINIATURE SERIES	1	UG-1466/U	81349
P2	CONNECTOR, PLUG, SUBMINIATURE SERIES	1	27-7	74868
P3	NOT USED			
P4	NOT USED			
P5	CONNECTOR, PLUG, MULTIPIN	1	MRE-7-2PG7	81312

REF DESIG PREFIX A5

Ref Desig	Description	Qty Per Assy	Vendor Part No.	Vendor Code
R1	RESISTOR, VARIABLE, COMPOSITION: 10 kΩ, 10%, 1/2W	2	70-08461	76055
R2	RESISTOR, VARIABLE, COMPOSITION: 100 kΩ, 10%, 1/4W	1	70-08460	76055
R3	Same as R1			
R4	RESISTOR, FIXED, COMPOSITION: 2.4 kΩ, 5%, 1/4W	1	CB2425	01121
R5	RESISTOR, FIXED, COMPOSITION: 17 kΩ, 5%, 1/4W	1	CB4735	01121
R6	RESISTOR, FIXED, COMPOSITION: 10 kΩ, 5%, 1/4W	1	CB1035	01121
S1	SWITCH, TOGGLE: SPDT	1	MST-115D	95146
V1	TUBE, CRT	1	3ASP1	82219
XV1	SOCKET, CRT	1	14075	14632
W1	CONNECTOR AND CABLE ASSEMBLY	1	30020-884	14632

5.4.6.1 Type 8132 IF Amplifier Board No. 1

REF DESIG PREFIX A5A1

Ref Desig	Description	Qty Per Assy	Vendor Part No.	Vendor Code
C1	CAPACITOR, CERAMIC, DISC: 0.005 µF, 20%, 500V	11	SM(.005µF, 20%)	91418
C2	CAPACITOR, COMPOSITION, TUBULAR: 2.7 pF, 10%, 500V	2	QC(2.7pF, 10%)	95121
C3	CAPACITOR, DIPPED MICA: 220 pF, 5%, 500V	4	CM05F221J03	81349
C4	Same as C1			
C5	CAPACITOR, DIPPED MICA: 43 pF, 5%, 500V	1	CM05E430J03	81349
C6	CAPACITOR, DIPPED MICA: 330 pF, 5%, 500V	3	CM05E331J03	81349
C7	Same as C1			
C8	CAPACITOR, COMPOSITION, TUBULAR: 4.3 pF, 10%, 500V	2	QC(4.3 pF, 10%)	95121
C9	Same as C3			
C10	Same as C1			
C11	Same as C1			
C12	CAPACITOR, DIPPED MICA: 47 pF, 5%, 500V	1	CM05E470J03	81349
C13	Same as C6			
C14	Same as C2			
C15	Same as C3			
C16	Same as C1			
C17	Same as C8			
C18	CAPACITOR, DIPPED MICA: 30 pF, 5%, 500V	1	CM05E300J03	81349
C19	Same as C3			
C20	Same as C1			
C21	CAPACITOR, COMPOSITION, TUBULAR: 1.0 pF, 10%, 500V	2	QC(1 pF, 10%)	95121
C22	Same as C6			
C23	CAPACITOR, ELECTROLYTIC, TANTALUM: 1.0µF, 10%, 35V	1	150D105X9035A2	56289
C24	CAPACITOR, DIPPED MICA: 24 pF, 5%, 500V	1	CM05E240J03	81349
C25	CAPACITOR, DIPPED MICA: 68 pF, 5%, 500V	2	CM05E680J03	81349
C26	Same as C25			
C27	Same as C1			
C28	CAPACITOR, DIPPED MICA: 39 pF, 5%, 500V	2	CM05E390J03	81349
C29	Same as C28			
C30	Same as C21			
C31	CAPACITOR, DIPPED MICA: 75 pF, 5%, 500V	1	CM05E750J03	81349
C32	Same as C1			
C33	Same as C1			
C34	Same as C1			

REF DESIG PREFIX A5A1

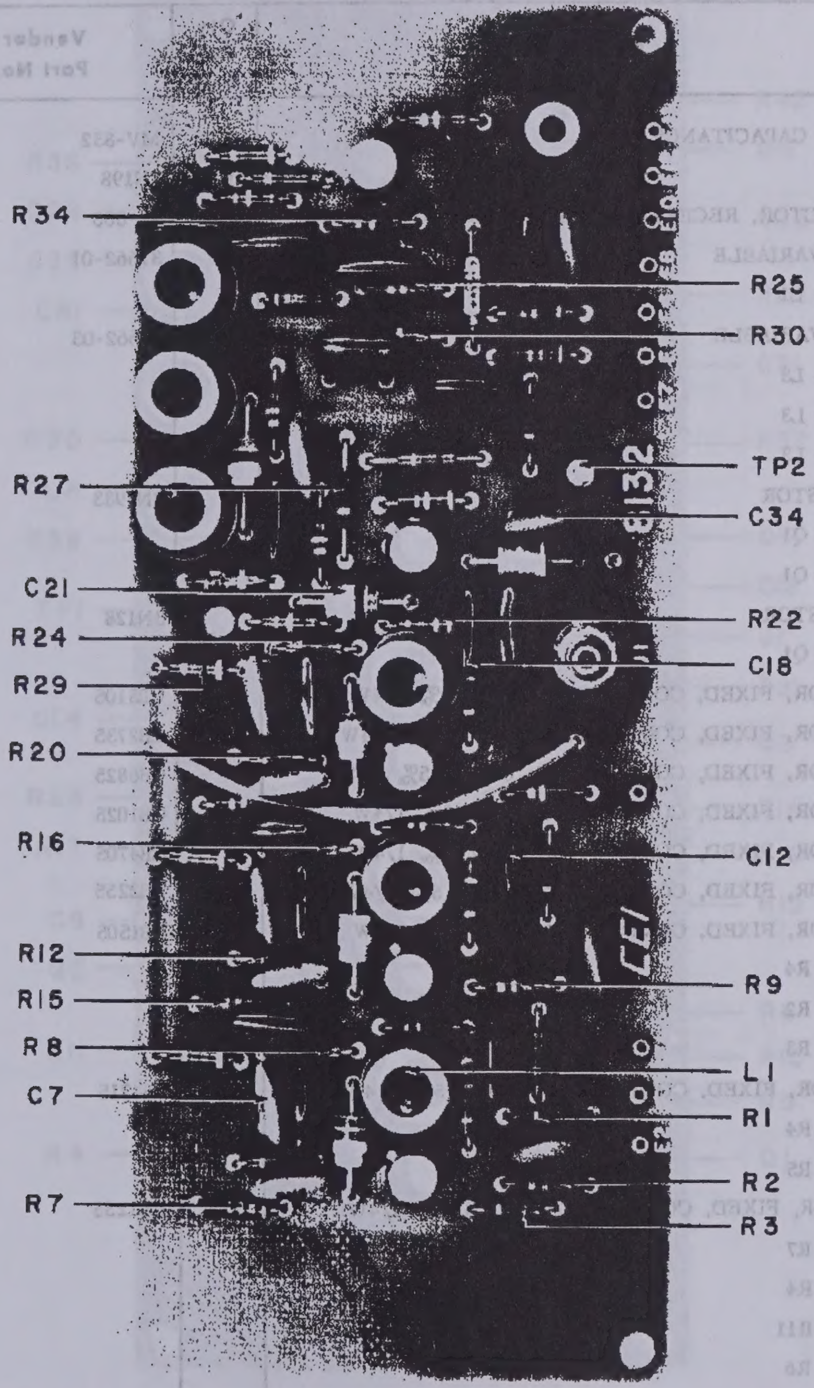
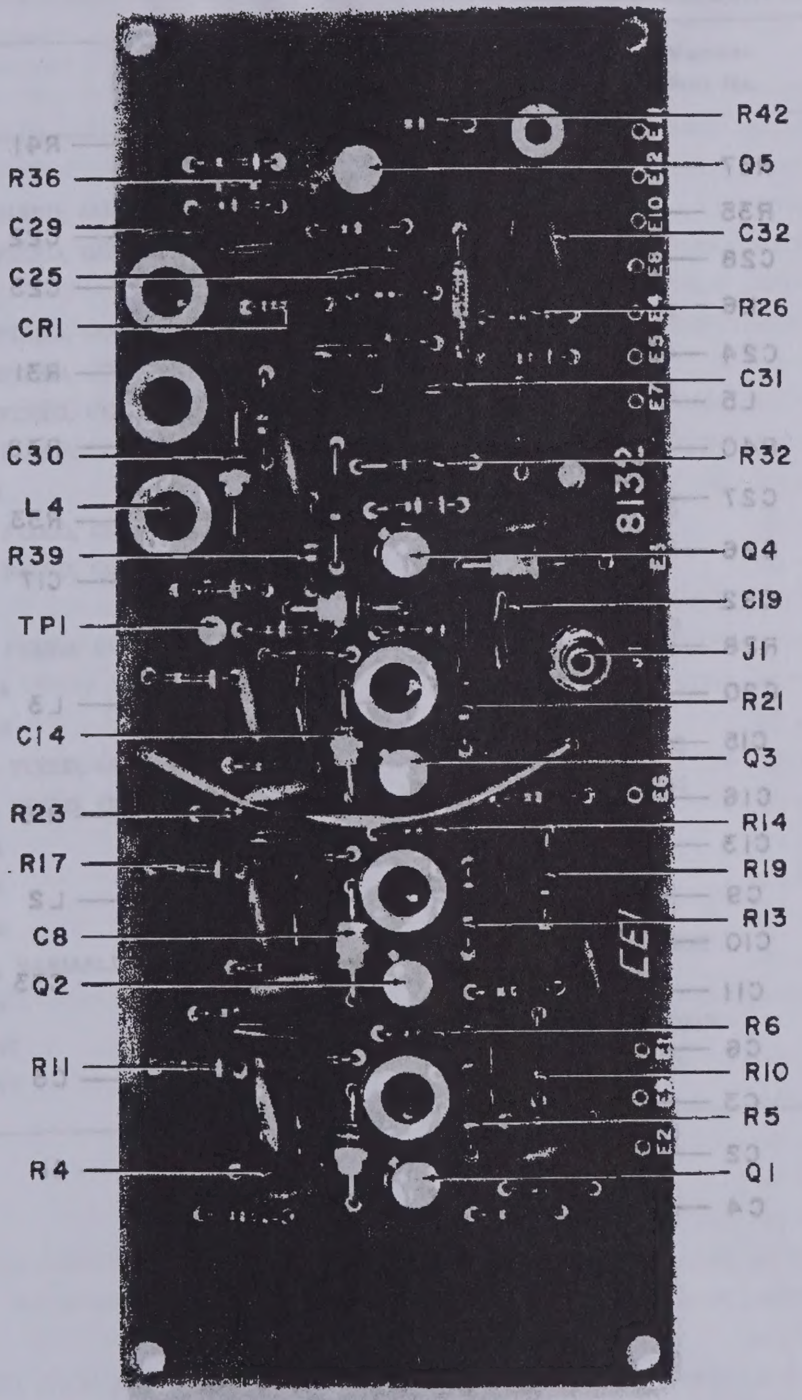

R34
R25
R30
R27
TP2
C34
C21
R22
R24
C18
R29
R20
R16
C12
R12
R9
R15
R8
L1
C7
R1
R2
R7
R3
8132
CEI

Figure 5-15. Type 8132 IF Amplifier Board # 1, Component Locations

REF DESIG PREFIX A5A1

Ref Desig	Description	Qty Per Assy	Vendor Part No.	Vendor Code
CR1	DIODE, CAPACITANCE	1	MV-832	04713
CR2	DIODE	1	1N198	80131
J1	CONNECTOR, RECEPTACLE, SUBMINIATURE SERIES	1	27-800	74868
L1	COIL, VARIABLE	2	31662-01	14632
L2	Same as L1			
L3	COIL, VARIABLE	4	31662-03	14632
L4	Same as L3			
L5	Same as L3			
L6	Same as L3			
Q1	TRANSISTOR	4	2N3933	80131
Q2	Same as Q1			
Q3	Same as Q1			
Q4	TRANSISTOR	1	3N128	80131
Q5	Same as Q1			
R1	RESISTOR, FIXED, COMPOSITION: 51 Ω, 5%, 1/4W	1	CB5105	01121
R2	RESISTOR, FIXED, COMPOSITION: 27 kΩ, 5%, 1/4W	4	CB2735	01121
R3	RESISTOR, FIXED, COMPOSITION: 6.8 kΩ, 5%, 1/4W	3	CB6825	01121
R4	RESISTOR, FIXED, COMPOSITION: 1 kΩ, 5%, 1/4W	9	CB1025	01121
R5	RESISTOR, FIXED, COMPOSITION: 47 Ω, 5%, 1/4W	3	CB4705	01121
R6	RESISTOR, FIXED, COMPOSITION: 22 kΩ, 5%, 1/4W	2	CB2255	01121
R7	RESISTOR, FIXED, COMPOSITION: 15 Ω, 5%, 1/4W	2	CB1505	01121
R8	Same as R4			
R9	Same as R2			
R10	Same as R3			
R11	RESISTOR, FIXED, COMPOSITION: 470 Ω, 5%, 1/4W	3	CB4715	01121
R12	Same as R4			
R13	Same as R5			
R14	RESISTOR, FIXED, COMPOSITION: 12 kΩ, 5%, 1/4W	1	CB1235	01121
R15	Same as R7			
R16	Same as R4			
R17	Same as R11			
R18	Same as R6			
R19	Same as R3			
R20	Same as R4			

REF DESIG PREFIX A5A1


R36
C29
C25
CR1
C30
L4
R39
TP1
C14
R23
R17
C8
Q2
R11
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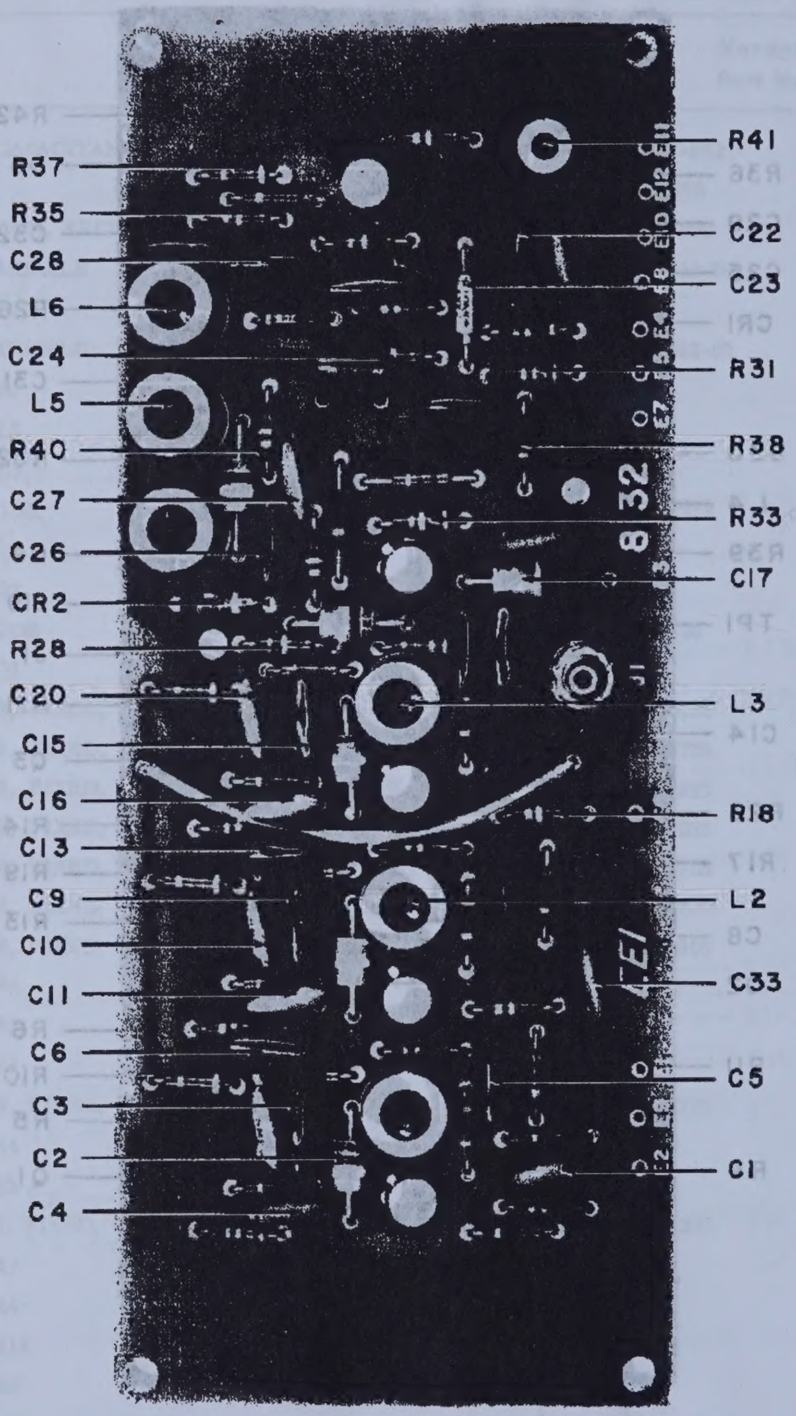
Q5
C32
R26
C31
R32
Q4
C19
J1
R21
Q3
R14
R19
R13
R6
R10
R5
Q1
E11
E12
E10
E8
E4
E5
E7
8132
E3
E6
CEI
E1
E9
E2

Figure 5-16. Type 8132 IF Amplifier Board #1, Component Locations

REF DESIG PREFIX A5A1


R37
R35
C28
L6
C24
L5
R40
C27
C26
CR2
R28
C20
C15
C16
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C10
C11
C6
C3
C2
C4
R41
C22
C23
R31
R38
R33
C17
L3
R18
L2
C33
C5
C1
8132
J1

Figure 5-17. Type 8132 IF Amplifier Board # 1, Component Locations

REF DESIG PREFIX A5A1

Ref Desig	Description	Qty Per Assy	Vendor Part No.	Vendor Code
21	Same as R5			
22	RESISTOR, FIXED, COMPOSITION: 430 Ω, 5%, 1/4W	1	CB4315	01121
23	RESISTOR, FIXED, COMPOSITION: 3.6 Ω, 5%, 1/4W	1	CB36G5	01121
R24	Same as R4			
R25	RESISTOR, FIXED, COMPOSITION: 2.7 Ω, 5%, 1/4W	1	CB27G5	01121
R26	RESISTOR, FIXED, COMPOSITION: 30 kΩ, 5%, 1/4W	1	CB3035	01121
R27	RESISTOR, FIXED, COMPOSITION: 2.2 kΩ, 5%, 1/4W	1	CB2225	01121
R28	RESISTOR, FIXED, COMPOSITION: 100 kΩ, 5%, 1/4W	3	CB1045	01121
R2	Same as R11			
R30	RESISTOR, FIXED, COMPOSITION: 220 kΩ, 5%, 1/4W	1	CB2245	01121
R31	RESISTOR, FIXED, COMPOSITION: 47 kΩ, 5%, 1/4W	1	CB4735	01121
R32	Same as R4			
R33	RESISTOR, FIXED, COMPOSITION: 470 kΩ, 5%, 1/4W	1	CB4745	01121
R34	Same as R28			
R35	Same as R28			
R36	RESISTOR, FIXED, COMPOSITION: 22 Ω, 5%, 1/4W	1	CB2205	01121
R37	RESISTOR, FIXED, COMPOSITION: 4.7 kΩ, 5%, 1/4W	1	CB4725	01121
R38	Same as R4			
R39	Same as R2			
R40	Same as R2			
R41	RESISTOR, VARIABLE, FILM: 10 kΩ, 30%, 1/2W	1	62PR10K	73138
R42	Same as R4			
T	TEST POINT	1	TJ-202BR	99687
TP2	TEST POINT	1	2010B	88245

5.4.6.2 Type 8133 IF Amplifier Board No. 2 REF DESIG PREFIX A5A2

Ref Desig	Description	Qty Per Assy	Vendor Part No.	Vendor Code
C1	CAPACITOR, CERAMIC, DISC: 0.01 µF, 20%, 50V	11	C023B101F103M	56289
C2	CAPACITOR, DIPPED MICA: 68 pF, 5%, 500V	1	CM05E680J03	81349
C3	Same as C1			
C4	CAPACITOR, COMPOSITION, TUBULAR: 1.0 pF, 10%, 500V	1	QC(1pF, 10%)	95121
C5	CAPACITOR, COMPOSITION, TUBULAR: 2.2 pF, 10%, 500V	1	QC(2.2pF, 10%)	95121
C6	CAPACITOR, DIPPED MICA: 47 pF, 5%, 500V	2	CM05E470J03	81349
C7	Same as C6			
C8	CAPACITOR, DIPPED MICA: 75 pF, 5%, 500V	1	CM05E750J03	81349
C9	CAPACITOR, DIPPED MICA: 560 pF, 5%, 500V	1	CM06F561J03	81349
C10	Same as C1			
C11	Same as C1			
C12	Same as C1			
C13	CAPACITOR, COMPOSITION, TUBULAR: 4.3 pF, 10%, 500V	2	QC(4.3pF, 10%)	95121
C14	CAPACITOR, DIPPED MICA: 680 pF, 5%, 500V	4	CM06F681J03	81349
C15	CAPACITOR, MYLAR, TUBULAR: 6800 pF, 10%, 100V	3	61F10AA682	06001
C16	Same as C1			
C17	CAPACITOR, DIPPED MICA: 620 pF, 5%, 500V	3	CM06F621J03	81349
C18	Same as C1			
C19	Same as C13			
C20	Same as C14			
C21	Same as C15			
C22	Same as C1			
C23	CAPACITOR, ELECTROLYTIC, TANTALUM: 1.0µF, 10%, 35V	2	150D105X9035A2	56289
C24	Same as C14			
C25	Same as C15			
C26	Same as C1			
C27	Same as C23			
C28	Same as C17			
C29	CAPACITOR, CERAMIC, DISC: 0.005 µF, 20%, 500V	1	SM(.005µF, 20%)	91418
C30	CAPACITOR, DIPPED MICA: 270 pF, 5%, 500V	2	CM05F271J03	81349
C31	Same as C30			
C32	CAPACITOR, CERAMIC, DISC: 0.01 µF, 20%, 500V	2	SM(.01 µF, 10%)	91418
C33	Same as C32			
C34	CAPACITOR, DIPPED MICA: 100 pF, 5%, 500V	2	CM05F101J03	91418

REF DESIG PREFIX A5A2

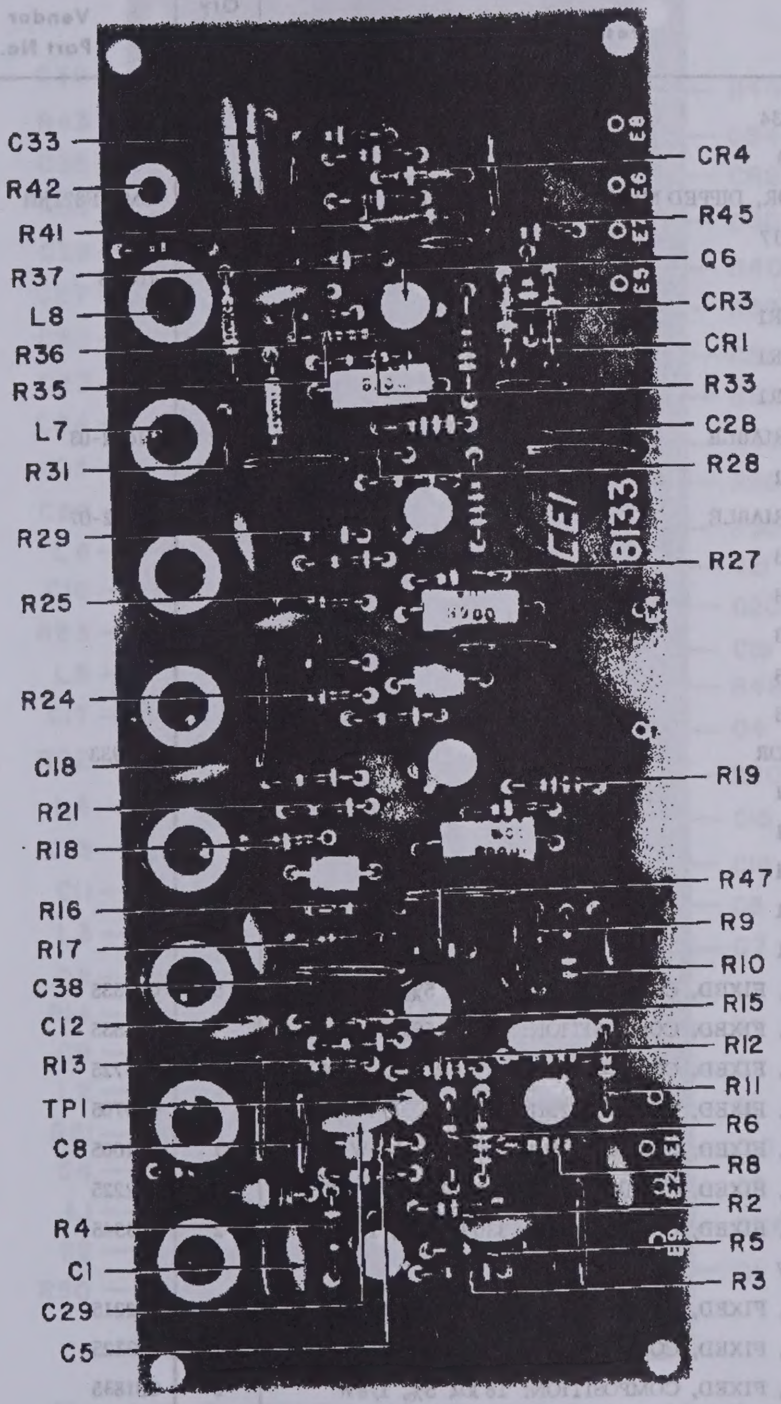
C33
R42
R41
R37
L8
R36
R35
L7
R31
R29
R25
R24
C18
R21
R18
R16
R17
C38
C12
R13
TP1
C8
R4
C1
C29
C5
CR4
R45
Q6
CR3
CR1
R33
C28
R28
R27
R19
R47
R9
R10
R15
R12
R11
R6
R8
R2
R5
R3
CEI
8133
E8
E6
E7
E3
E1
E2
E9

Figure 5-18. Type 8133 IF Amplifier Board # 2, Component Locations

REF DESIG PREFIX A5A2

Ref Desig	Description	Qty Per Assy	Vendor Part No.	Vendor Code
C35	Same as C34			
C36	NOT USED			
C37	CAPACITOR, DIPPED MICA: 820 pF, 5%, 500V	1	CM06F821J03	81349
C38	Same as C17			
CR1	DIODE	4	1N198	80131
CR2	Same as CR1			
CR3	Same as CR1			
CR4	Same as CR1			
L1	COIL, VARIABLE	2	31662-03	14632
L2	Same as L1			
L3	COIL, VARIABLE	6	31662-07	14632
L4	Same as L3			
L5	Same as L3			
L6	Same as L3			
L7	Same as L3			
L8	Same as L3			
Q1	TRANSISTOR	6	2N3933	80131
Q2	Same as Q1			
Q3	Same as Q1			
Q4	Same as Q1			
Q5	Same as Q1			
Q6	Same as Q1			
R1	RESISTOR, FIXED, COMPOSITION: 33 kΩ, 5%, 1/4W	5	CB3335	01121
R2	RESISTOR, FIXED, COMPOSITION: 15 kΩ, 5%, 1/4W	4	CB1535	01121
R3	RESISTOR, FIXED, COMPOSITION: 4.7 kΩ, 5%, 1/4W	4	CB4725	01121
R4	RESISTOR, FIXED, COMPOSITION: 47 Ω, 5%, 1/4W	7	CB4705	01121
R5	RESISTOR, FIXED, COMPOSITION: 10 Ω, 5%, 1/4W	1	CB1005	01121
R6	RESISTOR, FIXED, COMPOSITION: 2.2 kΩ, 5%, 1/4W	4	CB2225	01121
R7	RESISTOR, FIXED, COMPOSITION: 330 kΩ, 5%, 1/4W	2	CB3345	01121
R8	Same as R7			
R9	RESISTOR, FIXED, COMPOSITION: 220 Ω, 5%, 1/4W	1	CB2215	01121
R10	RESISTOR, FIXED, COMPOSITION: 3.3 kΩ, 5%, 1/4W	1	CB3325	01121
R11	RESISTOR, FIXED, COMPOSITION: 18 kΩ, 5%, 1/4W	2	CB1835	01121
R12	Same as R1			

REF DESIG PREFIX A5A2

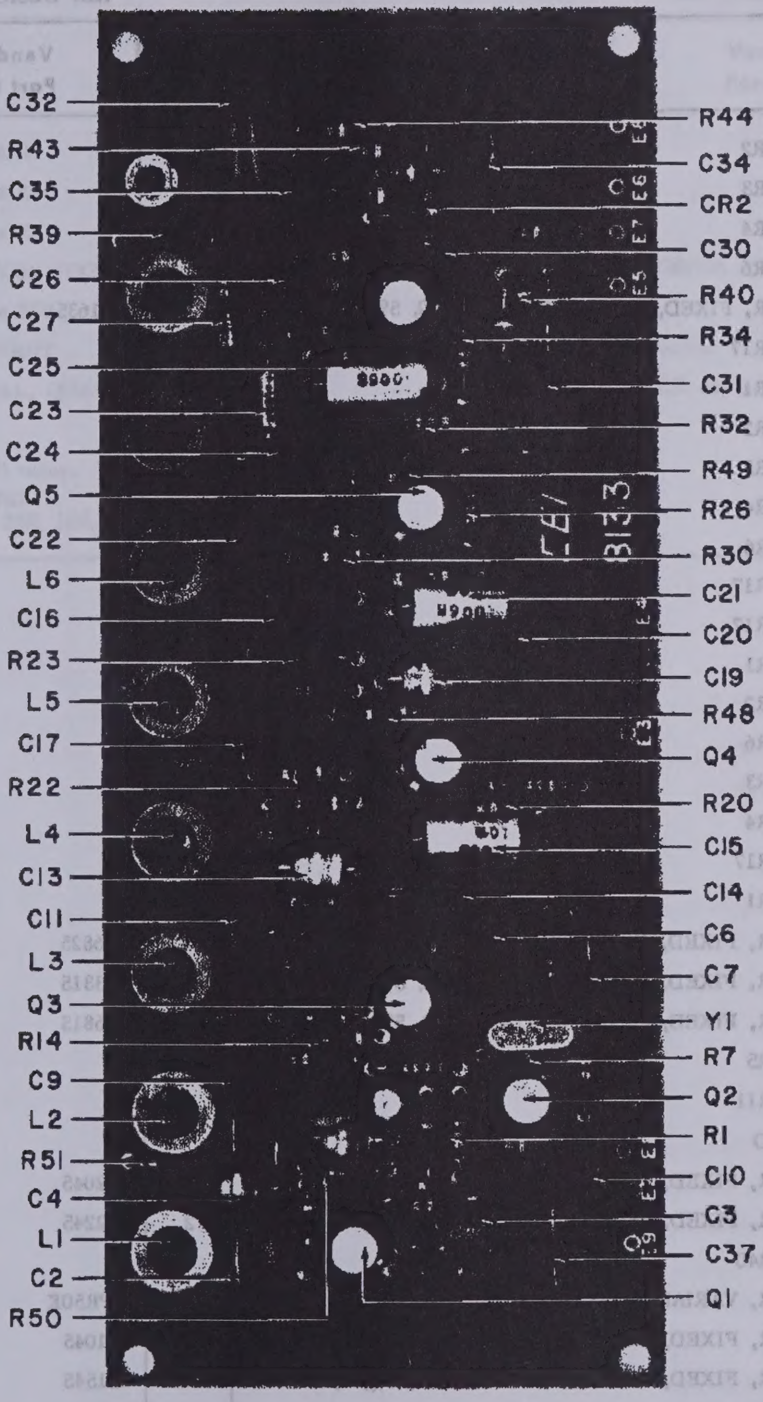
C32
R43
C35
R39
C26
C27
C25
C23
C24
Q5
C22
L6
C16
R23
L5
C17
R22
L4
C13
C11
L3
Q3
R14
C9
L2
R51
C4
L1
C2
R50
R44
C34
CR2
C30
R40
R34
C31
R32
R49
R26
R30
C21
C20
C19
R48
Q4
R20
C15
C14
C6
C7
Y1
R7
Q2
R1
C10
C3
C37
Q1
8133

Figure 5-19. Type 8133 IF Amplifier Board # 2, Component Locations

REF DESIG PREFIX A5A2

Ref Desig	Description	Qty Per Assy	Vendor Part No.	Vendor Code
R13	Same as R2			
R14	Same as R3			
R15*	Same as R4			
R16	Same as R6			
R17	RESISTOR, FIXED, COMPOSITION: 16 kΩ, 5%, 1/4W	6	CB1635	01121
R18	Same as R17			
R19	Same as R1			
R20	Same as R2			
R21	Same as R3			
R22	Same as R4			
R23	Same as R6			
R24	Same as R17			
R25	Same as R17			
R26	Same as R1			
R27	Same as R2			
R28	Same as R6			
R29	Same as R3			
R30	Same as R4			
R31	Same as R17			
R32	Same as R1			
R33	RESISTOR, FIXED, COMPOSITION: 6.8 kΩ, 5%, 1/4W	1	CB6825	01121
R34	RESISTOR, FIXED, COMPOSITION: 330 Ω, 5%, 1/4W	1	CB3315	01121
R35	RESISTOR, FIXED, COMPOSITION: 680 Ω, 5%, 1/4W	1	CB6815	01121
R36	Same as R5			
R37	Same as R11			
R38	NOT USED			
R39	RESISTOR, FIXED, COMPOSITION: 200 kΩ, 5%, 1/4W	1	CB2045	01121
R40	RESISTOR, FIXED, COMPOSITION: 220 kΩ, 5%, 1/4W	2	CB2245	01121
R41	Same as R40			
R42	RESISTOR, VARIABLE, FILM: 50 kΩ, 30%, 1/2W	1	62PR50K	73138
R43	RESISTOR, FIXED, COMPOSITION: 100 kΩ, 5%, 1/4W	2	CB1045	01121
R44	RESISTOR, FIXED, COMPOSITION: 150 kΩ, 5%, 1/4W	1	CB1545	01121
R45	Same as R43			
R46	NOT USED			

REF DESIG PREFIX A5A2

Ref Desig	Description	Qty Per Assy	Vendor Part No.	Vendor Code
R47	Same as R4			
R48	Same as R4			
R49	Same as R4			
R50	RESISTOR, FIXED, COMPOSITION: 27 kΩ, 5%, 1/4W	2	CB2735	01121
R51	Same as R50			
TP1	TEST POINT	1	2010B	88245
Y1	CRYSTAL, QUARTZ: 14.000 MHz	1	CR-64/U	81349
*	Nominal value. Final value factory selected from the following: 47Ω, 22Ω, 10Ω, or 5.6Ω; all to be 5%, 1/4W.			

5.4.6.3 Type 8232 Sweep Generator

REF DESIG PREFIX A5A3

Ref Desig	Description	Qty Per Assy	Vendor Part No.	Vendor Code
C1	CAPACITOR, ELECTROLYTIC, TANTALUM: 1.0 µF, 10%, 35V	1	150D105X9035A2	56289
C2	CAPACITOR, ELECTROLYTIC, TANTALUM: 2.3 µF, 10%, 10V	1	151D235X9010W2	56289
C3	CAPACITOR, ELECTROLYTIC, TANTALUM: 10 µF, 10%, 35V	1	150D106X9035R2	56289
C4	CAPACITOR, ELECTROLYTIC, ALUMINUM: 100 µF, -10, +75%, 25V	1	30D107G025DD2	56289
CR1	DIODE	1	1N967A	80131
CR2	NOT USED			
CR3	DIODE	3	1N462A	80131
CR4	Same as CR3			
CR5	DIODE	1	1N746A	80131
CR6	DIODE	1	1N749A	80131
CR7	Same as CR3			
CR8	DIODE	1	1N751A	80131
Q1	TRANSISTOR	1	2N2646	80131
Q2	TRANSISTOR	6	2N2270	80131
Q3	TRANSISTOR	2	2N4037	80131
Q4	Same as Q2			
Q5	Same as Q2			
Q6	TRANSISTOR	2	2N3440	80131
Q7	Same as Q6			
Q8	Same as Q2			
Q9	Same as Q2			
Q10	Same as Q3			
Q11	Same as Q2			
R1	RESISTOR, VARIABLE, FILM: 10 kΩ, 30%, 1/2W	2	62PR10K	73138
R2	RESISTOR, FIXED, COMPOSITION: 330 kΩ, 5%, 1/4W	2	CB3345	01121
R3	RESISTOR, FIXED, COMPOSITION: 15 kΩ, 5%, 1/4W	7	CB1535	01121
R4	RESISTOR, FIXED, COMPOSITION: 100 kΩ, 5%, 1/4W	3	CB1045	01121
R5	RESISTOR, VARIABLE, FILM: 200 kΩ, 30%, 1/2W	2	62PR200K	73138
R6	Same as R4			
R7	RESISTOR, FIXED, COMPOSITION: 4.7 kΩ, 5%, 1/4W	4	CB4725	01121
R8	RESISTOR, FIXED, COMPOSITION: 22 kΩ, 5%, 1/4W	4	CB2235	01121
R9	Same as R3			

REF DESIG PREFIX A5A3

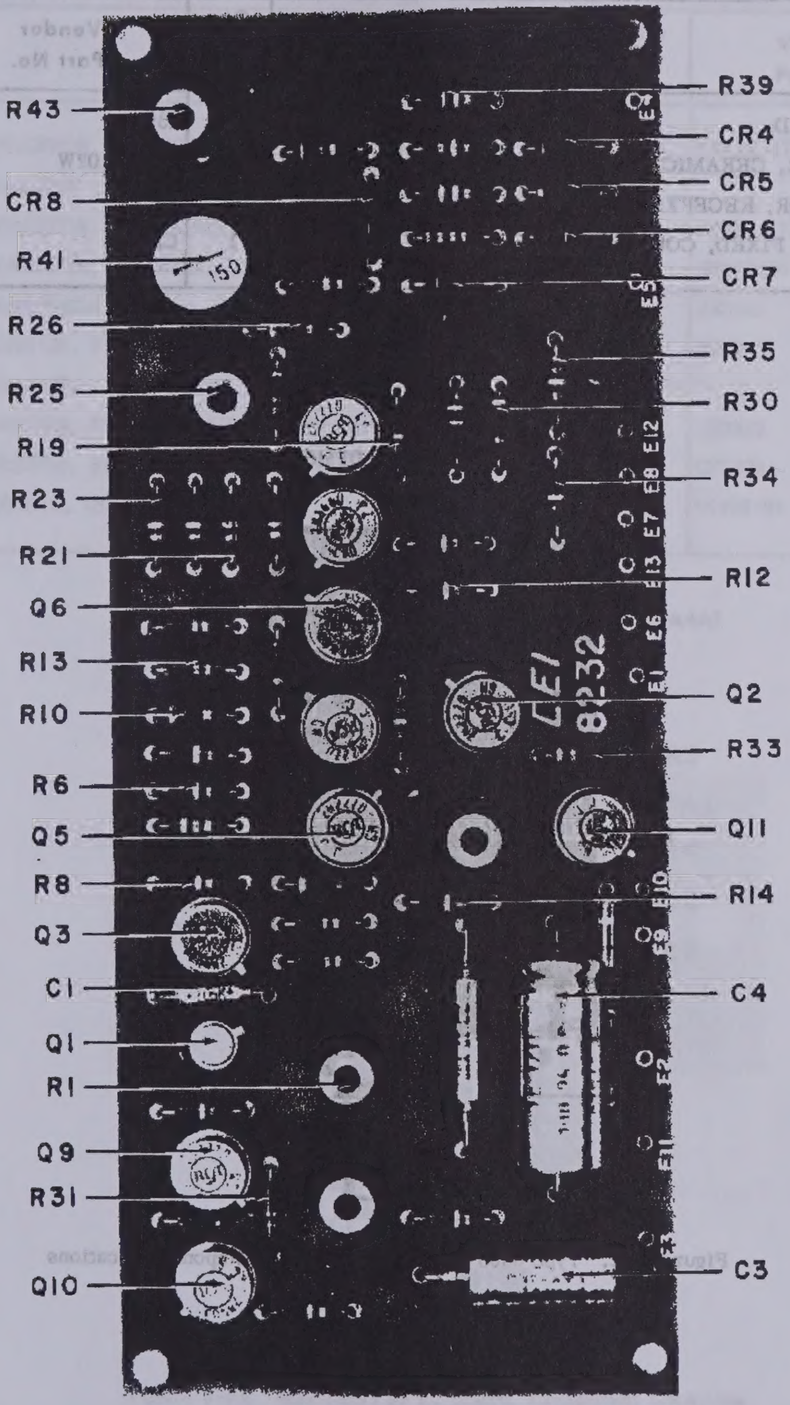
R43
CR8
R41
R26
R25
R19
R23
R21
Q6
R13
R10
R6
Q5
R8
Q3
C1
Q1
R1
Q9
R31
Q10
R39
CR4
CR5
CR6
CR7
R35
R30
R34
R12
Q2
R33
Q11
R14
C4
C3
CEI
8232
150
E1
E2
E3
E4
E5
E6
E7
E8
E9
E10
E11
E12
E13

Figure 5-20. Type 8232 Sweep Generator, Component Locations

5.4.6.4 Type 8306 Crystal Oscillator

REF DESIG PREFIX A5A4

Ref Desig	Description	Qty Per Assy	Vendor Part No.	Vendor Code
A1	P. C. BOARD	1	13991	14632
C1	CAPACITOR, CERAMIC, FEEDTHRU: 1000 pF, GMV, 500V	1	FA5C-102W	01121
J1	CONNECTOR, RECEPTACLE, SUBMINIATURE SERIES	1	27-9	74868
R1	RESISTOR, FIXED, COMPOSITION: 3.3 kΩ, 5%, 1/4W	1	CB3325	01121

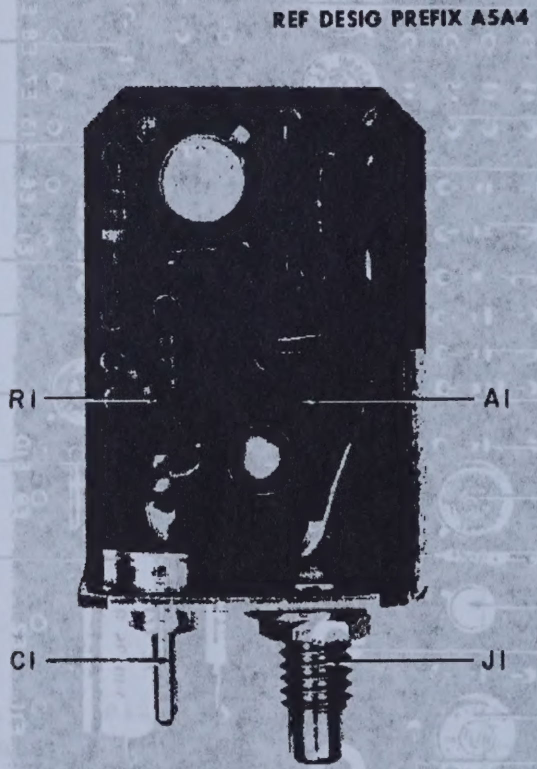

Figure 5-22. Type 8306 Crystal Oscillator, Component Locations

5.4.6.4.1 Part 13991 P. C. Board REF DESIG PREFIX A5A4A1

Ref Desig	Description	Qty Per Assy	Vendor Part No.	Vendor Code
C1	CAPACITOR, DIPPED MICA: 47 pF, 5%, 500V	2	DM10-470J	72136
C2	Same as C1			
C3	CAPACITOR, DIPPED MICA: 470 pF, 5%, 500V	1	DM15-471J	72136
C4	CAPACITOR, CERAMIC, DISC: 0.005 µF, 20%, 50V	1	C023B101E502M	56289
Q1	TRANSISTOR	1	2N3933	80131
R1	RESISTOR, FIXED, COMPOSITION: 330 kΩ, 5%, 1/4W	2	CB3345	01121
R2	Same as R1			
R3	RESISTOR, FIXED, COMPOSITION: 220 Ω, 5%, 1/4W	1	CB2215	01121
R4	RESISTOR, FIXED, COMPOSITION: 3.3 kΩ, 5%, 1/4W	1	CB3325	01121
1	CRYSTAL, QUARTZ: 21.4 MHz	1	96402-01	14632

REF DESIG PREFIX A5A4A1

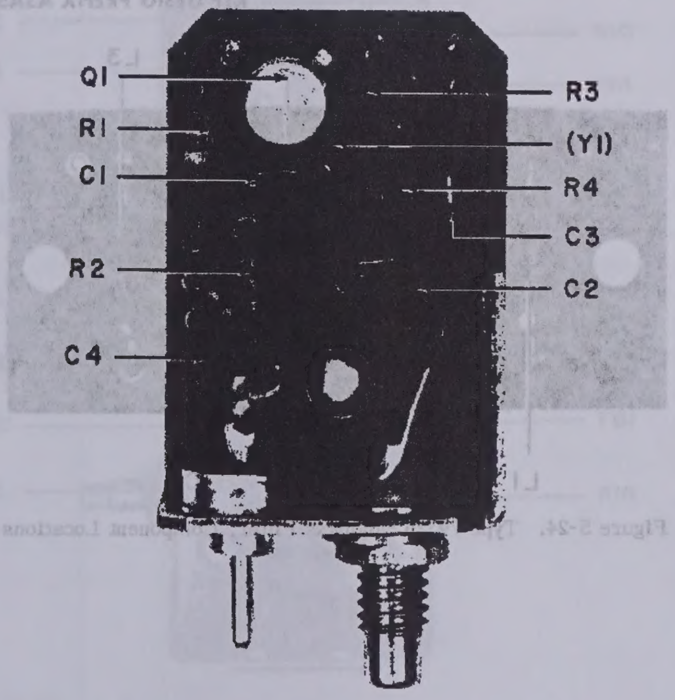

Figure 5-23. Part 13991 P. C. Board, Component Locations

5.4.6.5 Type 79326 Bandpass Filter

REF DESIG PREFIX A5A5

Ref Desig	Description	Qty Per Assy	Vendor Part No.	Vendor Code
C1	CAPACITOR, DIPPED MICA: 500 pF, 5%, 300V	2	DM15-501J	72136
C2	CAPACITOR, DIPPED MICA: 56 pF, 5%, 300V	1	CM05E560J03	81349
C3	Same as C1			
L1	COIL, FIXED	2	1131-95	14632
L2	COIL, FIXED	1	1131-92	14632
L3	Same as L1			

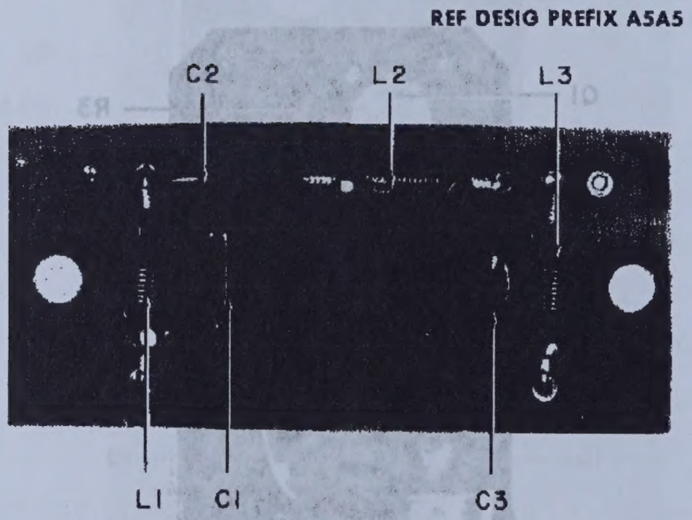

Figure 5-24. Type 79326 Bandpass Filter, Component Locations

REF DESIG PREFIX A6

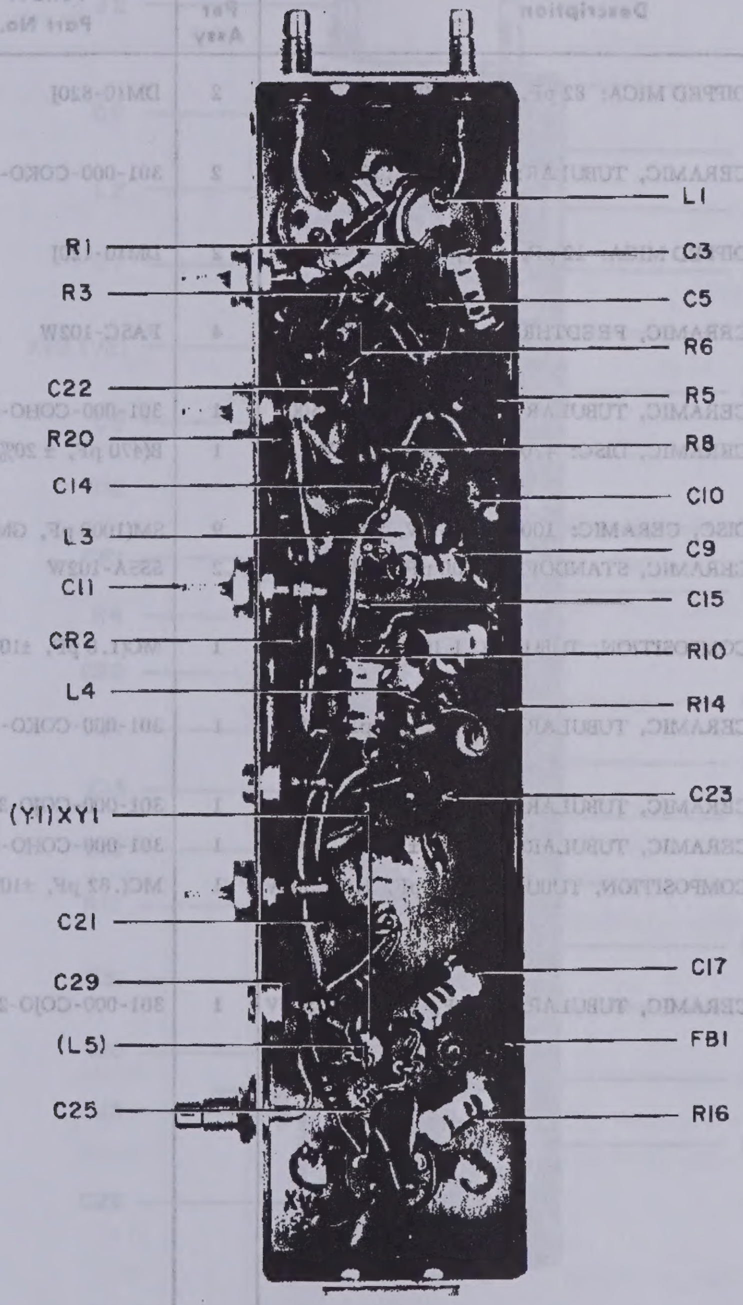
L1
R1
C3
R3
C5
R6
C22
R5
R20
R8
C14
C10
L3
C9
C11
C15
CR2
R10
L4
R14
C23
(Y1)XY1
C21
C17
C29
FB1
(L5)
C25
R16

Figure 5-25. Type 7120 60-21.4 MC Converter, Component Locations

5.4.7 Type 7120 60-21.4 MC Converter

REF DESIG PREFIX A6

Ref Desig	Description	Qty Per Assy	Vendor Part No.	Vendor Code
C1	CAPACITOR, DIPPED MICA: 82 pF, ±5%, 500V	2	DM10-820J	72136
C2	Same as C1			
C3	CAPACITOR, CERAMIC, TUBULAR: 2.2 pF, ±.25 pF,500V	2	301-000-COKO-109C	72982
C4	Same as C3			
C5	CAPACITOR, DIPPED MICA: 12 pF, ±5%, 500V	2	DM10-120J	72136
C6	Same as C5			
C7	CAPACITOR, CERAMIC, FEEDTHRU: 1000 pF, GMV,500V	4	FA5C-102W	01121
C8	Same as C7			
C9	CAPACITOR, CERAMIC, TUBULAR: 4.7 pF, ±.25pF, 500V	1	301-000-COHO-479C	72982
C10	CAPACITOR, CERAMIC, DISC: 470 pF, ± 20 %, 1000V	1	B(470 pF, ± 20%)	91418
C11	Same as C7			
C12	CAPACITOR, DISC, CERAMIC: 1000 pF, GMV, 500V	9	SM(1000 pF, GMV)	91418
C13	CAPACITOR, CERAMIC, STANDOFF: 1000 pF, GMV, 500V	2	SS5A-102W	01121
C14	Same as C12			
C15	CAPACITOR, COMPOSITION, TUBULAR: 1.0 pF, ±10%, 500V	1	MC(1.0 pF, ±10%)	95121
C16	Same as C12			
C17	CAPACITOR, CERAMIC, TUBULAR: 1.5 pF, ±.1pF, 500V	1	301-000-COKO-159B	72982
C18	Same as C7			
C19	CAPACITOR, CERAMIC, TUBULAR: 3.3 pF, ±.25 pF, 500V	1	301-000-COJO-339C	72982
C20	CAPACITOR, CERAMIC, TUBULAR: 6.8 pF, ±.5 pF, 500V	1	301-000-COHO-689D	72982
C21	CAPACITOR, COMPOSITION, TUBULAR: .82 pF, ±10%, 500V	1	MC(.82 pF, ±10%)	95121
C22	Same as C12			
C23	Same as C12			
C24	CAPACITOR, CERAMIC, TUBULAR: 2.7 pF, ±.25 pF, 500V	1	301-000-COJO-279C	72982
C25	Same as C12			
C26	Same as C12			
C27	Same as C12			
C28	NOT USED			
C29	Same as C12			
C30	NOT USED			
C31	Same as C13			
CR1	DIODE	2	1N4003	80131
CR2	Same as CR1			
FB1	FERRITE BEAD	1	56-590-65/4A	02114

REF DESIG PREFIX A6

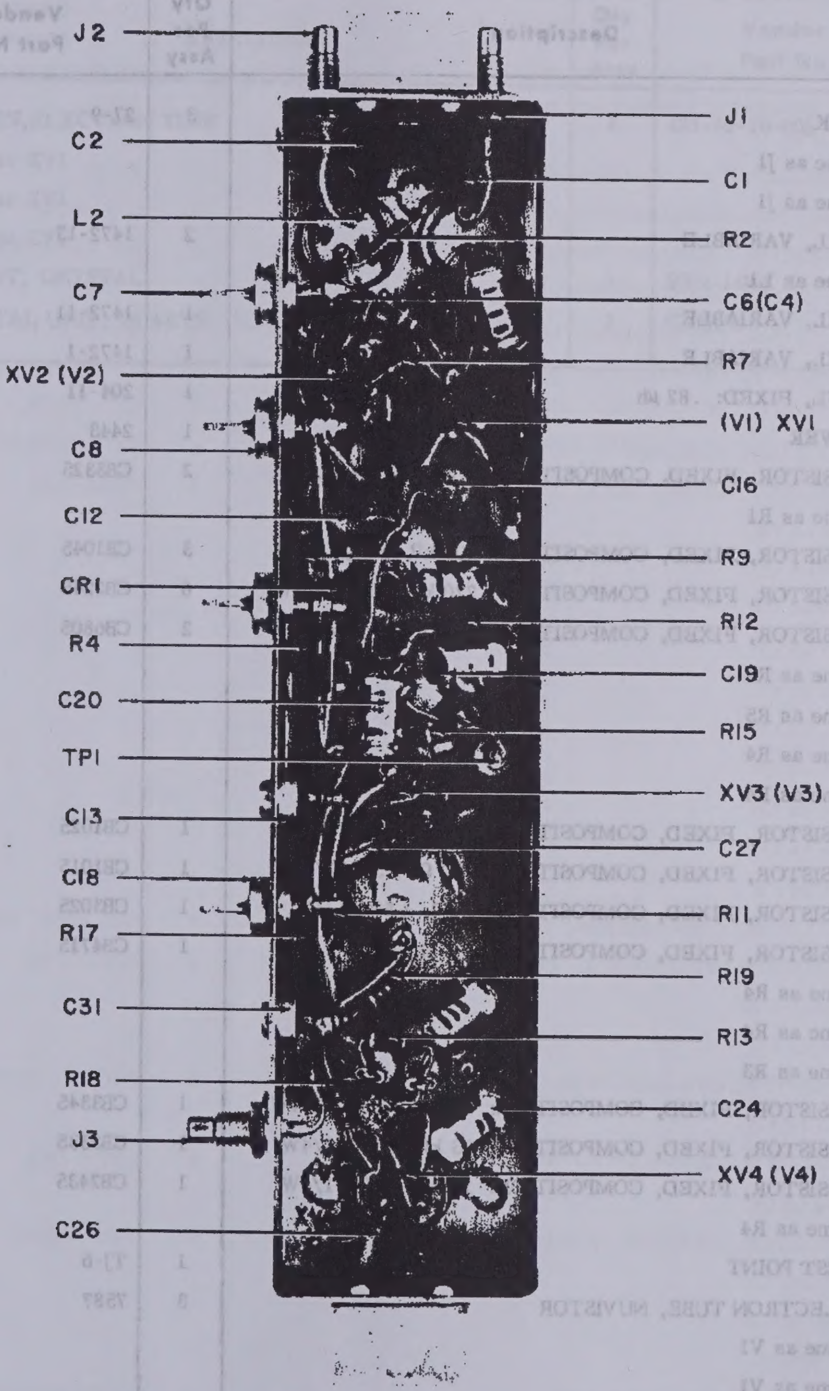
J2
J1
C2
C1
L2
R2
C7
C6(C4)
R7
XV2 (V2)
(V1) XV1
C8
C16
C12
R9
CR1
R12
R4
C19
C20
R15
TP1
XV3 (V3)
C13
C27
C18
R11
R17
R19
C31
R13
R18
C24
J3
XV4 (V4)
C26

Figure 5-26. Type 7120 60-21.4 MC Converter Component Locations

REF DESIG PREFIX A6

Ref Desig	Description	Qty Per Assy	Vendor Part No.	Vendor Code
J1	JACK	3	27-9	74868
J2	Same as J1			
J3	Same as J1			
L1	COIL, VARIABLE	2	1472-13	14632
L2	Same as L1			
L3	COIL, VARIABLE	1	1472-11	14632
L4	COIL, VARIABLE	1	1472-1	14632
L5	COIL, FIXED: .82 µh	1	204-11	99848
MP1	COVER	1	2443	14632
R1	RESISTOR, FIXED, COMPOSITION: 3.3 kΩ, ±5%, 1/4W	2	CB3325	01121
R2	Same as R1			
R3	RESISTOR, FIXED, COMPOSITION: 100 kΩ, ±5%, 1/4W	3	CB1045	01121
R4	RESISTOR, FIXED, COMPOSITION: 220 kΩ, ±5%, 1/4W	6	CB2245	01121
R5	RESISTOR, FIXED, COMPOSITION: 68 Ω, ±5%, 1/4W	2	CB6805	01121
R6	Same as R3			
R7	Same as R5			
R8	Same as R4			
R9	Same as R4			
R10	RESISTOR, FIXED, COMPOSITION: 1 kΩ, ±5%, 1/4W	1	CB1025	01121
R11	RESISTOR, FIXED, COMPOSITION: 100 Ω, ±5%, 1/4W	1	CB1015	01121
R12	RESISTOR, FIXED, COMPOSITION: 3 kΩ, ±5%, 1/4W	1	CB3025	01121
R13	RESISTOR, FIXED, COMPOSITION: 470 Ω, ±5%, 1/4W	1	CB4715	01121
R14	Same as R4			
R15	Same as R4			
R16	Same as R3			
R17	RESISTOR, FIXED, COMPOSITION: 330 kΩ, ±5%, 1/4W	1	CB3345	01121
R18	RESISTOR, FIXED, COMPOSITION: 33 kΩ, ±5%, 1/4W	1	CB3335	01121
R19	RESISTOR, FIXED, COMPOSITION: 24 kΩ, ±5%, 1/4W	1	CB2435	01121
R20	Same as R4			
TP1	TEST POINT	1	TJ-6	04013
V1	ELECTRON TUBE, NUVISTOR	3	7587	80131
V2	Same as V1			
V3	Same as V1			
V4	ELECTRON TUBE, NUVISTOR	1	6CW4	80131

REF DESIG PREFIX A6

Ref Desig	Description	Qty Per Assy	Vendor Part No.	Vendor Code
XV1	SOCKET,ELECTRON TUBE	4	133-65-10-001	71785
XV2	Same as XV1			
XV3	Same as XV1			
XV4	Same as XV1			
XY1	SOCKET, CRYSTAL	1	8004-1G13	91506
Y1	CRYSTAL UNIT, QUARTZ: 81.4 MC	1	CR82/U	81349

5.4.8 Type 7233 IF Amplifier (2MC Bandwidth)

REF DESIG PREFIX A7

Ref Desig	Description	Qty Per Assy	Vendor Part No.	Vendor Code
A1	FM LIMITERS/DEMODULATOR & EMITTER FOLLOWER MODULE	1	10523	14632
A2	VIDEO AMPLIFIER & AGC MODULE	1	10527	14632
C1	CAPACITOR, CERAMIC, DISC: 1000 pF, GMV, 500V	2	SM(.001 µF, GMV)	91418
C2	CAPACITOR, CERAMIC, TUBULAR: 1.8 pF, ±.25 pF, 500V	2	301-000-COKO-189C	72982
C3	CAPACITOR, CERAMIC, DISC: .0015 µF, ± 10%, 500V	2	DD-152	71590
C4	CAPACITOR, DIPPED MICA: 33 pF, ±5%, 500V	2	DM10-330J	72136
C5	CAPACITOR, DIPPED MICA: 100 pF, ±5%, 500V	4	DM10-101J	72136
C6	CAPACITOR, STANDOFF: .001 µF, GMV, 500V	5	SS5A-102W	01121
C7	CAPACITOR, CERAMIC, TUBULAR: 3.9 pF, ±.25 pF, 500V	2	301-000-COHO-399C	72982
C8	CAPACITOR, DIPPED MICA: 24 pF, ±5%, 500V	3	DM10-240J	72136
C9	Same as C5			
C10	Same as C1			
C11	Same as C2			
C12	Same as C4			
C13	Same as C5			
C14	Same as C6			
C15	Same as C7			
C16	Same as C8			
C17	Same as C5			
C18	Same as C3			
C19	CAPACITOR, COMPOSITION, TUBULAR: .68 pF, ±10%, 500V	1	QC(.68pF, 10%)	95121
C20	CAPACITOR, DIPPED MICA: 47 pF, ±5%, 500V	2	DM10-470J	72136
C21	Same as C20			
C22	Same as C6			
C23	CAPACITOR, CERAMIC, TUBULAR: 6.2 pF, ±.5 pF, 500V	1	301-000-COHO-629D	72982
C24	Same as C8			
C25	CAPACITOR, DIPPED MICA: 68 pF, ±5%, 500V	1	DM10-680J	72136
C26	Same as C6			
C27	CAPACITOR, CERAMIC, FEEDTHRU: 1000 pF, GMV, 500V	9	FA5C-102W	01121
C28	Same as C27			
C29	Same as C27			
C30	NOT USED			
C31	CAPACITOR, ELECTROLYTIC, TANTALUM: 47µF, 10%, 6V	1	150D476X9006B2	56289
C32	Same as C6			

REF DESIG PREFIX A7

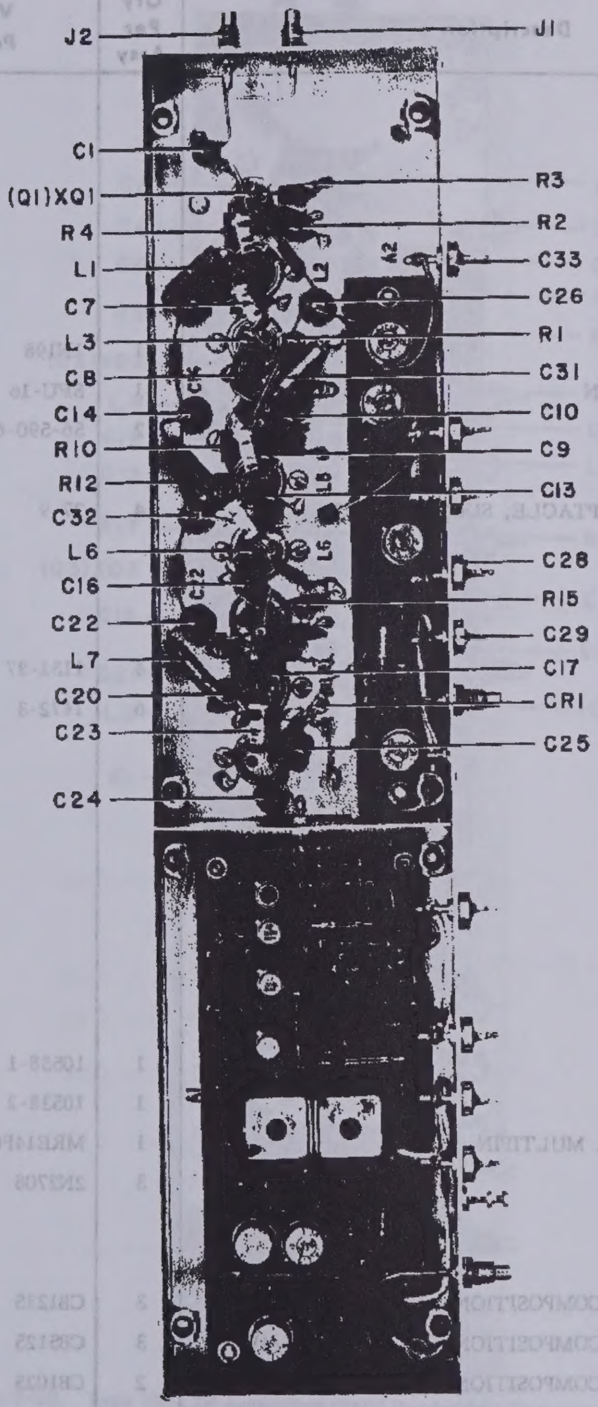
J2
J1
C1
(Q1)XQ1
R4
L1
C7
L3
C8
C14
R10
R12
C32
L6
C16
C22
L7
C20
C23
C24
R3
R2
C33
C26
R1
C31
C10
C9
C13
C28
R15
C29
C17
CR1
C25

Figure 5-27. Type 7233 IF Amplifier (2 MC Bandwidth), Component Locations

REF DESIG PREFIX A7

Ref Desig	Description	Qty Per Assy	Vendor Part No.	Vendor Code
C33	Same as C27			
C34	Same as C27			
C35	Same as C27			
C36	Same as C27			
C37	Same as C27			
C38	Same as C27			
CR1	DIODE	1	1N198	80131
E1	FEEDTHRU, TEFLON	1	SFU-16	04013
FB1	FERRITE BEAD	2	56-590-65/4A	02114
FB2	Same as FB1			
J1	CONNECTOR, RECEPTACLE, SUBMINIATURE	4	27-9	74868
J2	Same as J1			
J3	Same as J1			
J4	Same as J1			
L1	COIL, FIXED	4	1131-37	14632
L2	COIL, VARIABLE	6	1472-3	14632
L3	Same as L2			
L4	Same as L1			
L5	Same as L2			
L6	Same as L2			
L7	Same as L1			
L8	Same as L2			
L9	Same as L2			
L10	Same as L1			
MP1	COVER	1	10538-1	14632
MP2	COVER	1	10538-2	14632
P1	CONNECTOR, PLUG, MULTIPIN	1	MRE14PG7	81312
Q1	TRANSISTOR	3	2N2708	80131
Q2	Same as Q1			
Q3	Same as Q1			
R1	RESISTOR, FIXED, COMPOSITION: 12 k, ±5%, 1/4W	3	CB1235	01121
R2	RESISTOR, FIXED, COMPOSITION: 5.1 k, ±5%, 1/4W	3	CB5125	01121
R3	RESISTOR, FIXED, COMPOSITION: 1 k, ±5%, 1/4W	2	CB1025	01121
R4	RESISTOR, FIXED, COMPOSITION: 47 Ω, ±5%, 1/4W	4	CB4705	01121

REF DESIG PREFIX A7

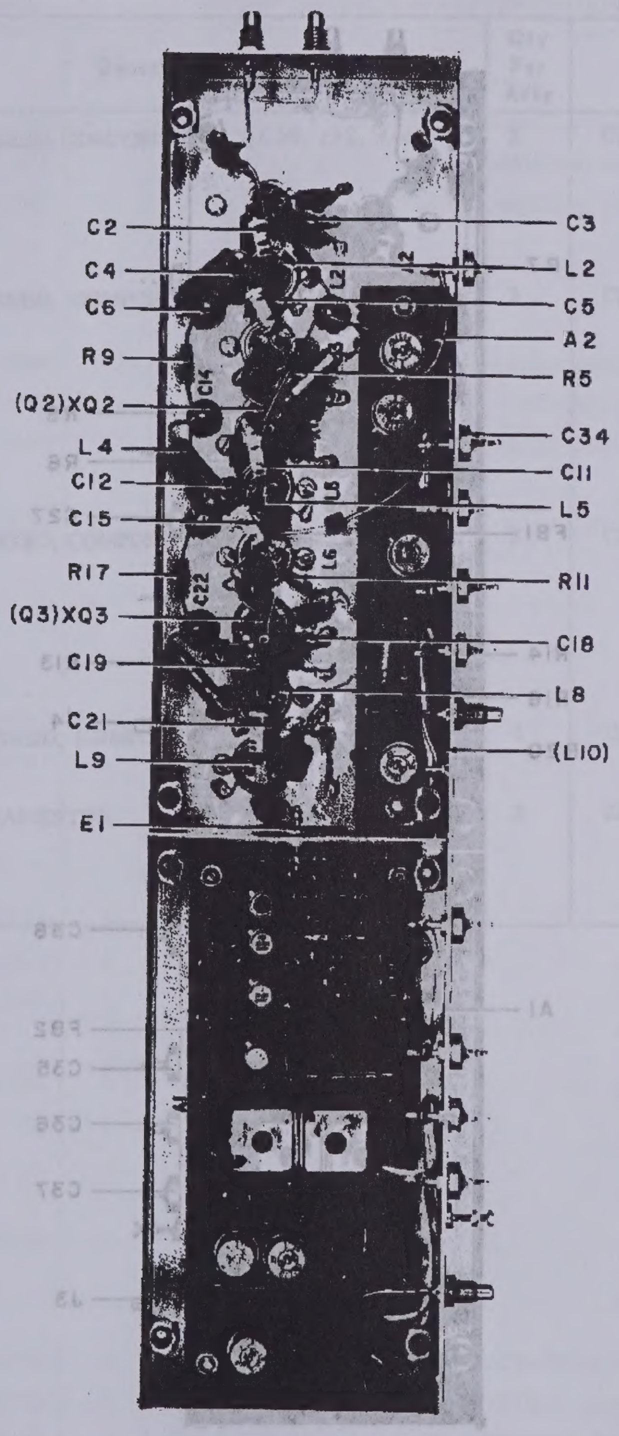
C2
C3
C4
L2
C6
C5
A2
R9
R5
(Q2)XQ2
C14
C34
L4
C11
C12
L5
C15
R17
C22
R11
(Q3)XQ3
C18
C19
L8
C21
L9
(L10)
E1

Figure 5-28. Type 7233 IF Amplifier (2MC Bandwidth) Component Locations

REF DESIG PREFIX A7

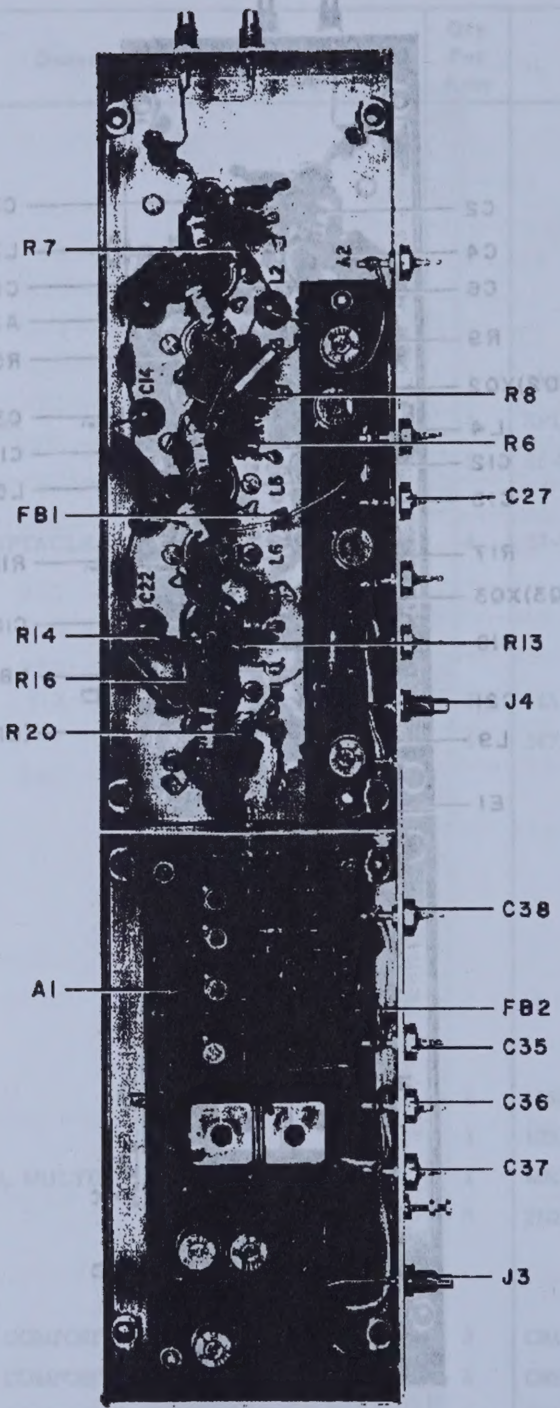
R7
A2
C14
R8
R6
C27
FB1
C22
R14
R13
R16
J4
R20
C38
A1
FB2
C35
C36
C37
J3

Figure 5-29. Type 7233 IF Amplifier (2MC Bandwidth), Component Locations

REF DESIG PREFIX A7

Ref Desig	Description	Qty Per Assy	Vendor Part No.	Vendor Code
R5	RESISTOR, FIXED, COMPOSITION: 5.6 kΩ, ±5%, 1/4W	2	CB5625	01121
R6	Same as R2			
R7	Same as R1			
R8	Same as R3			
R9	RESISTOR, FIXED, COMPOSITION: 100 Ω, ±5%, 1/4W	2	CB1015	01121
R10	Same as R4			
R11	Same as R5			
R12	Same as R9			
R13	Same as R2			
R14	Same as R1			
R15	RESISTOR, FIXED, COMPOSITION: 470 Ω, ±5%, 1/4W	2	CB4715	01121
R16	Same as R4			
R17	Same as R4			
R18	NOT USED			
R19	NOT USED			
R20	RESISTOR, FIXED, COMPOSITION: 6.8 kΩ, ±5%, 1/4W	1	CB6825	01121
R21	Same as R15			
XQ1	SOCKET, TRANSISTOR	3	22-16-4	81073
XQ2	Same as XQ1			
XQ3	Same as XQ1			

5.4.8.1 Part 10523/2 FM Limiters/Demodulator & Emitter Follower REF DESIG PREFIX A7A1

Ref Desig	Description	Qty Per Assy	Vendor Part No.	Vendor Code
C1	CAPACITOR, CERAMIC DISC: .005 µF, 20%, 500V	3	SM(.005 µF, 20%)	91418
C2	CAPACITOR, CERAMIC DISC: .001 µF, GMV, 500V	5	SM(.001 µF, GMV)	91418
C3	Same as C1			
C4	Same as C2			
C5	Same as C2			
C6	CAPACITOR, DIPPED MICA: 15 pF, 5%, 500V	1	DM10-150J	72136
C7	CAPACITOR, DIPPED MICA: 10 pF, 5%, 500V	1	DM10-100J	72136
C8	CAPACITOR, DIPPED MICA: 47 pF, 5%, 500V	2	DM10-470J	72136
C9	Same as C8			
C10	CAPACITOR, DIPPED MICA: 20 pF, 5%, 500V	1	DM10-200J	72136
C11	Same as C1			
C12	Same as C2			
C13	NOT USED			
C14	Same as C2			
CR1	DIODE	4	1N198	80131
CR2	DIODE	1	1N753A	80131
CR3	Same as CR1			
CR4	Same as CR1			
CR5	Same as CR1			
L1	COIL, FIXED	1	1131-41	14632
L2	COIL, FIXED	2	1131-40	14632
L3	COIL, VARIABLE	1	3476-19	14632
L4	Same as L2			
Q1	TRANSISTOR	4	2N706	80131
Q2	Same as Q1			
Q3	Same as Q1			
Q4	Same as Q1			
Q5	TRANSISTOR	3	2N2270	80131
Q6	Same as Q5			
Q7	Same as Q5			
R1	RESISTOR, FIXED, COMPOSITION: 12 k, 5%, 1/4W	4	CB1235	01121
R2	RESISTOR, FIXED, COMPOSITION: 5.1 k, 5%, 1/4W	5	CB5125	01121
R3	RESISTOR, FIXED, COMPOSITION: 1 k, 5%, 1/4W	1	CB1025	01121
R4	Same as R2			

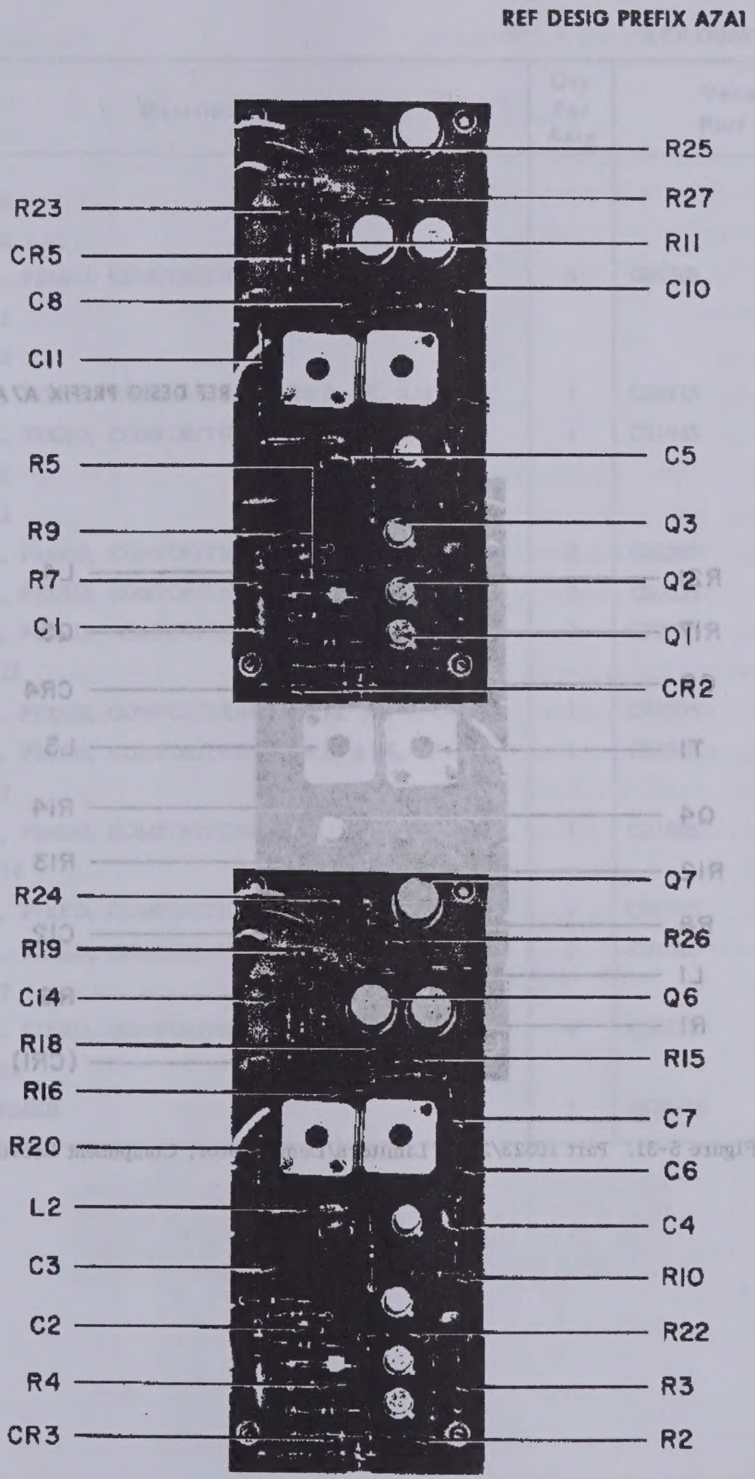
REF DESIG PREFIX A7A1
R25
R23
R27
R11
CR5
C10
C8
C11
R5
C5
R9
Q3
R7
Q2
C1
Q1
CR2
Q7
R24
R26
R19
C14
Q6
R18
R15
R16
C7
R20
C6
L2
C4
C3
R10
C2
R22
R4
R3
CR3
R2

Figure 5-30. Part 10523/2 FM Limiters/Demodulator, Component Locations

REF DESIG PREFIX A7A1

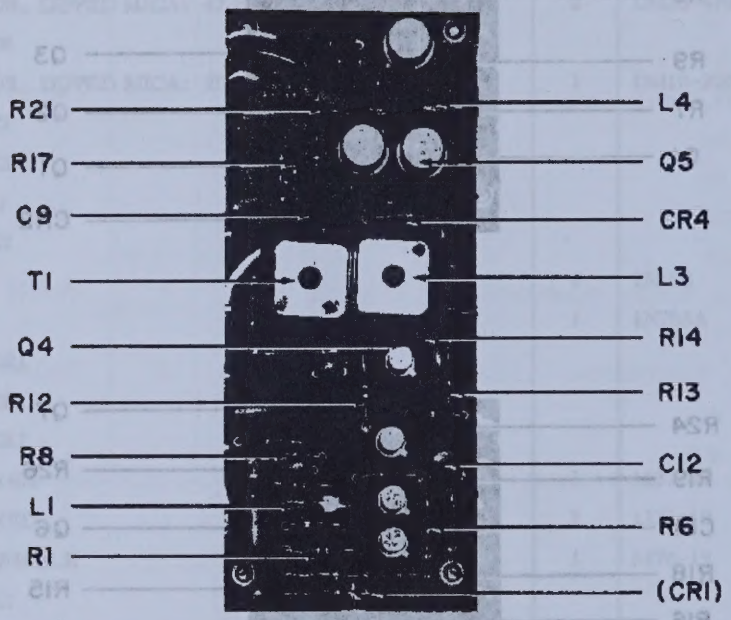
R21
R17
C9
T1
Q4
R12
R8
L1
R1
L4
Q5
CR4
L3
R14
R13
C12
R6
(CR1)

Figure 5-31. Part 10523/2 FM Limiters/Demodulator, Component Locations

REF DESIG PREFIX A7A1

Ref Desig	Description	Qty Per Assy	Vendor Part No.	Vendor Code
R5	Same as R1			
R6	Same as R2			
R7	RESISTOR, FIXED, COMPOSITION: 47 Ω, 5%, 1/4W	3	CB4705	01121
R8	Same as R1			
R9	Same as R2			
R10	RESISTOR, FIXED, COMPOSITION: 620 Ω, 5%, 1/4W	1	CB6215	01121
R11	RESISTOR, FIXED, COMPOSITION: 100 k, 5%, 1/4W	1	CB1045	01121
R12	Same as R1			
R13	Same as R2			
R14	RESISTOR, FIXED, COMPOSITION: 22 Ω, 5%, 1/4W	2	CB2205	01121
R15	RESISTOR, FIXED, COMPOSITION: 75 k, 5%, 1/4W	2	CB7535	01121
R16	RESISTOR, FIXED, COMPOSITION: 2.7 k, 5%, 1/4W	2	CB2725	01121
R17	Same as R15			
R18	RESISTOR, FIXED, COMPOSITION: 4.7 M, 5%, 1/4W	1	CB4755	01121
R19	RESISTOR, FIXED, COMPOSITION: 330 k, ±5%, 1/4W	1	CB3345	01121
R20	Same as R7			
R21	RESISTOR, FIXED, COMPOSITION: 10 k, 5%, 1/4W	1	CB1035	01121
R22	Same as R14			
R23	RESISTOR, FIXED, COMPOSITION: 18 k, 5%, 1/4W	1	CB1835	01121
R24	RESISTOR, FIXED, COMPOSITION: 100 Ω, 5%, 1/4W	1	CB1015	01121
R25	Same as R7			
R26	RESISTOR, FIXED, COMPOSITION: 270 Ω, 5%, 1/4W	1	CB2715	01121
R27	Same as R16			
T1	TRANSFORMER	1	3476-18	14632

5.4.8.2 Part 10527 Video Amplifier & AGC Module REF DESIG PREFIX A7A2

Ref Desig	Description	Qty Per Assy	Vendor Part No.	Vendor Code
C1	CAPACITOR, FIXED, ELECTROLYTIC: 4.7 μF, 20%, 35V	1	150D475X0035B2	56289
C2	CAPACITOR, FIXED, ELECTROLYTIC: 1.0 μF, 20%, 35V	1	150D105X0035A2	56289
C3	CAPACITOR, DIPPED MICA: 33 pF, 5%, 500V	1	DM10-330J	72136
Q1	TRANSISTOR	4	2N2270	80131
Q2	Same as Q1			
Q3	Same as Q1			
Q4	Same as Q1			
R1	RESISTOR, FIXED, COMPOSITION: 100 k, 5%, 1/4W	1	CB1045	01121
R2	RESISTOR, FIXED, COMPOSITION: 22 k, 5%, 1/4W	1	CB2235	01121
R3	RESISTOR, FIXED, COMPOSITION: 1 k, 5%, 1/4W	1	CB1025	01121
R4	RESISTOR, FIXED, COMPOSITION: 33 k, 5%, 1/4W	1	CB3335	01121
R5	NOT USED			
R6	RESISTOR, FIXED, COMPOSITION: 10 k, 5%, 1/4W	1	CB1035	01121
R7	RESISTOR, FIXED, COMPOSITION: 12 k, 5%, 1/4W	1	CB1235	01121
R8	RESISTOR, FIXED, COMPOSITION: 470 Ω, 5%, 1/4W	1	CB4715	01121
R9	RESISTOR, FIXED, COMPOSITION: 51 k, 5%, 1/4W	1	CB5135	01121
R10	RESISTOR, FIXED, COMPOSITION: 47 Ω, 5%, 1/4W	1	CB4705	01121
R11	RESISTOR, FIXED, COMPOSITION: 270 Ω, 5%, 1/4W	1	CB2715	01121
R12	RESISTOR, FIXED, COMPOSITION: 100 Ω, 5%, 1/4W	1	CB1015	01121

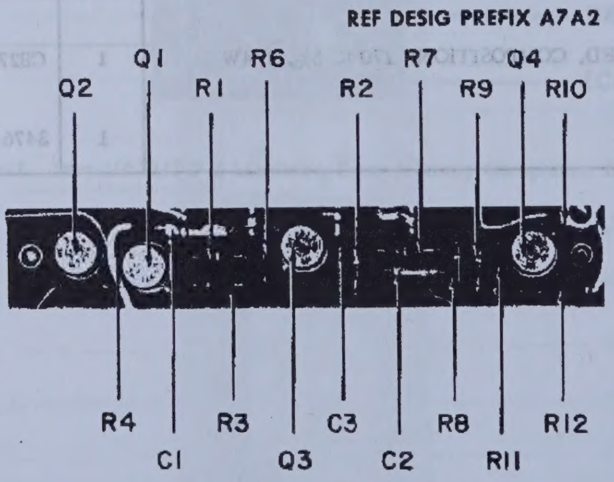

Figure 5-32. Part 10527 Video Amplifier and AGC Module, Component Locations

REF DESIG PREFIX A8

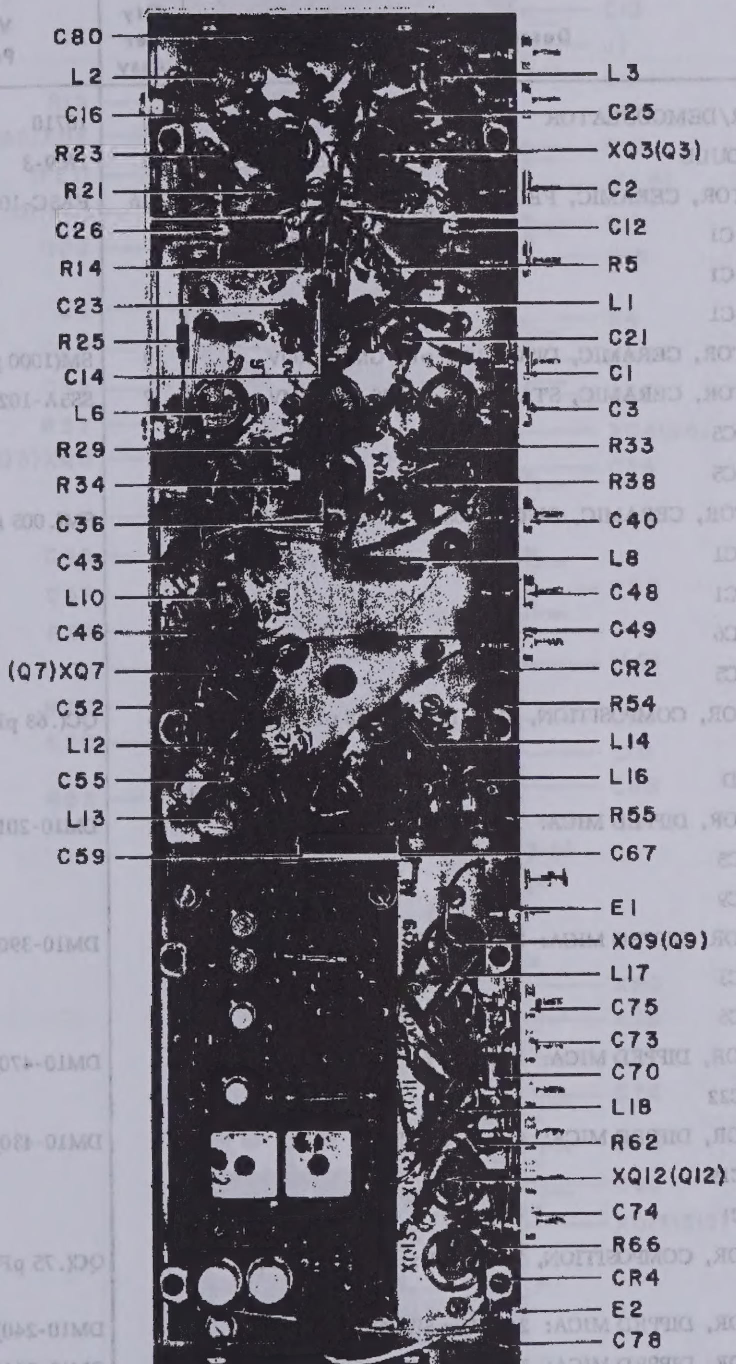
C80
L2
C16
R23
R21
C26
R14
C23
R25
C14
L6
R29
R34
C36
C43
L10
C46
(Q7)XQ7
C52
L12
C55
L13
C59
L3
C25
XQ3(Q3)
C2
C12
R5
L1
C21
C1
C3
R33
R38
C40
L8
C48
C49
CR2
R54
L14
L16
R55
C67
E1
XQ9(Q9)
L17
C75
C73
C70
L18
R62
XQ12(Q12)
C74
R66
CR4
E2
C78

Figure 5-33. Type 7245 20/75/300 KC Bandwidth IF Strip, Component Locations

5.4.9 Type 7245 20/75/300 KC Bandwidth IF Strip

REF DESIG PREFIX A8

Ref Desig	Description	Qty Per Assy	Vendor Part No.	Vendor Code
A1	LIMITER/DEMODULATOR	1	10710	14632
A2	BFO MODULE	1	1769-3	14632
C1	CAPACITOR, CERAMIC, FEEDTHRU: 1000 pF, GMV, 500V	16	FA5C-102W	01121
C2	Same as C1			
C3	Same as C1			
C4	Same as C1			
C5	CAPACITOR, CERAMIC, DISC: 1000 pF, GMV, 500V	9	SM(1000 pF, GMV)	91418
C6	CAPACITOR, CERAMIC, STANDOFF: 1000 pF, GMV, 500V	7	SS5A-102W	01121
C7	Same as C5			
C8	Same as C5			
C9	CAPACITOR, CERAMIC, DISC: .005 µF, ± 20%, 500V	4	SM(.005 µF, ±20%)	91418
C10	Same as C1			
C11	Same as C1			
C12	Same as C6			
C13	Same as C5			
C14	CAPACITOR, COMPOSITION, TUBULAR: 0.68 pF, ± 10%, 500V	6	QC(.68 pF, ± 10%)	95121
C15	NOT USED			
C16	CAPACITOR, DIPPED MICA: 200 pF, ± 5%, 500V	1	DM10-201J	72136
C17	Same as C5			
C18	Same as C9			
C19	CAPACITOR, DIPPED MICA: 39 pF, ± 5%, 500V	6	DM10-390J	72136
C20	Same as C5			
C21	Same as C6			
C22	CAPACITOR, DIPPED MICA: 47 pF, 5%, 500V	8	DM10-470J	72136
C23	Same as C22			
C24	CAPACITOR, DIPPED MICA: 43 pF, 5%, 500V	1	DM10-430J	72136
C25	Same as C19			
C26	Same as C1			
C27	CAPACITOR, COMPOSITION, TUBULAR: 0.75 pF, ± 10%, 500V	3	QC(.75 pF, ± 10%)	95121
C28	CAPACITOR, DIPPED MICA: 24 pF, ± 5%, 500V	4	DM10-240J	72136
C29	CAPACITOR, DIPPED MICA: 360 pF, ± 5%, 500V	3	DM15-361J	72136
C30	Same as C19			
C31	Same as C6			

REF DESIG PREFIX A8

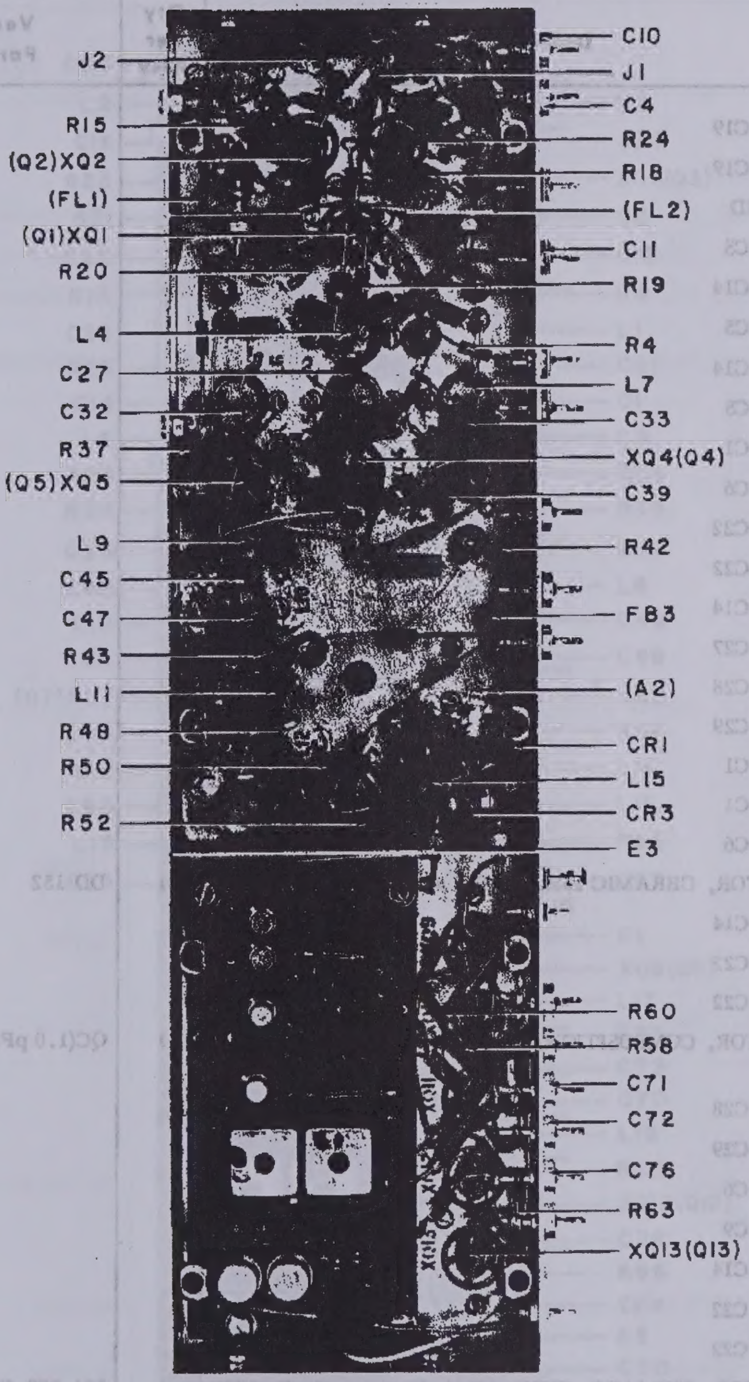
J2
R15
(Q2)XQ2
(FL1)
(Q1)XQ1
R20
L4
C27
C32
R37
(Q5)XQ5
L9
C45
C47
R43
L11
R48
R50
R52
C10
J1
C4
R24
R18
(FL2)
C11
R19
R4
L7
C33
XQ4(Q4)
C39
R42
FB3
(A2)
CR1
L15
CR3
E3
R60
R58
C71
C72
C76
R63
XQ13(Q13)

Figure 5-34. Type 7245 20/75/300 KC Bandwidth IF Strip, Component Locations

REF DESIG PREFIX A8

Ref Desig	Description	Qty Per Assy	Vendor Part No.	Vendor Code
C32	Same as C19			
C33	Same as C19			
C34	NOT USED			
C35	Same as C5			
C36	Same as C14			
C37	Same as C5			
C38	Same as C14			
C39	Same as C5			
C40	Same as C1			
C41	Same as C6			
C42	Same as C22			
C43	Same as C22			
C44	Same as C14			
C45	Same as C27			
C46	Same as C28			
C47	Same as C29			
C48	Same as C1			
C49	Same as C1			
C50	Same as C6			
C51	CAPACITOR, CERAMIC DISC: .0015 µF, ± 10%	1	DD-152	71590
C52	Same as C14			
C53	Same as C22			
C54	Same as C22			
C55	CAPACITOR, COMPOSITION, TUBULAR: 1.0 pF, ± 10%, 500V	1	QC(1.0 pF, ± 10%)	95121
C56	Same as C28			
C57	Same as C29			
C58	Same as C6			
C59	Same as C9			
C60	Same as C14			
C61	Same as C22			
C62	Same as C22			
C63	CAPACITOR, CERAMIC, TUBULAR: 2.4 pF, ± .25 pF, 500V	1	301-000-COJO-249C	72982
C64	CAPACITOR, CERAMIC, TUBULAR: 3.3 pF, ± .25 pF, 500V	1	301-000-COJO-339C	72982

REF DESIG PREFIX A8

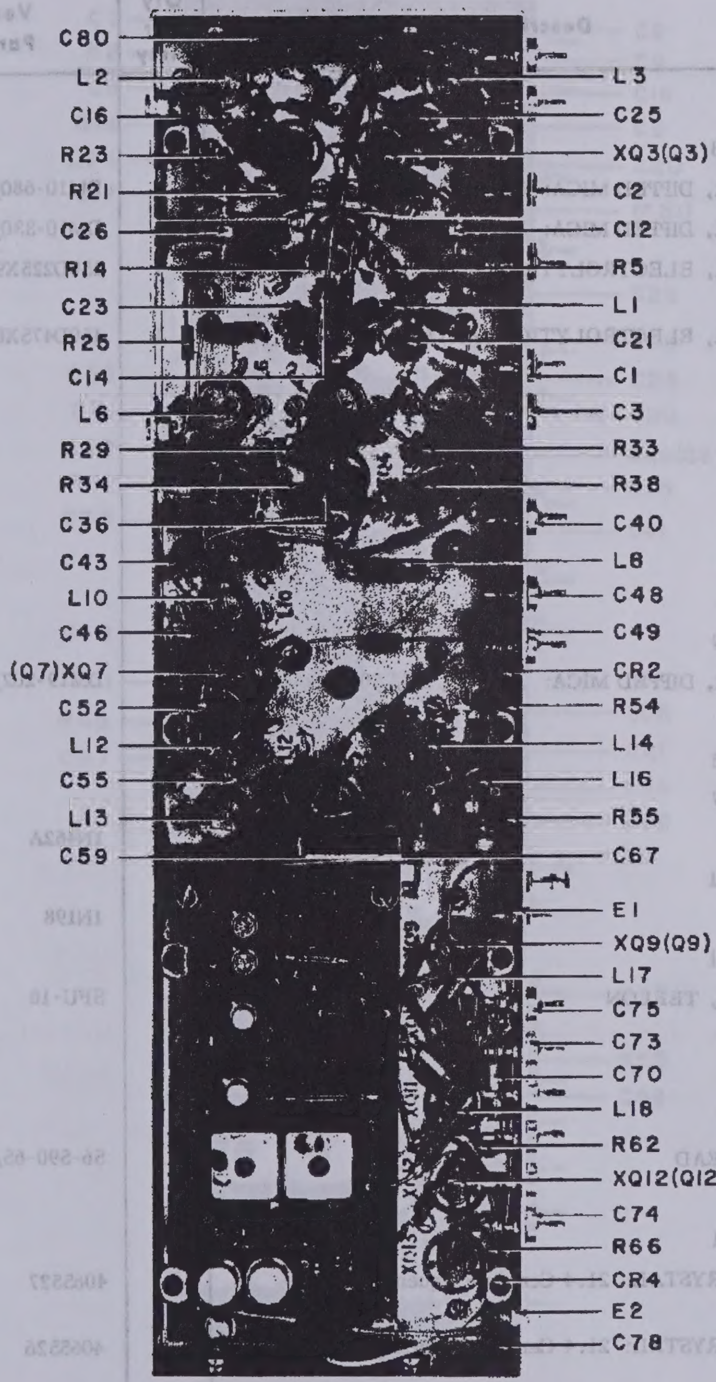
C80
L2
C16
R23
R21
C26
R14
C23
R25
C14
L6
R29
R34
C36
C43
L10
C46
(Q7)XQ7
C52
L12
C55
L13
C59
L3
C25
XQ3(Q3)
C2
C12
R5
L1
C21
C1
C3
R33
R38
C40
L8
C48
C49
CR2
R54
L14
L16
R55
C67
E1
XQ9(Q9)
L17
C75
C73
C70
L18
R62
XQ12(Q12)
C74
R66
CR4
E2
C78

Figure 5-35. Type 7245 20/75/300 KC Bandwidth IF Strip, Component Locations

REF DESIG PREFIX A8

Ref Desig	Description	Qty Per Assy	Vendor Part No.	Vendor Code
C65	Same as C9			
C66	Same as C28			
C67	CAPACITOR, DIPPED MICA: 68 pF, ±5%, 500V	1	DM10-680J	72136
C68	CAPACITOR, DIPPED MICA: 33 pF, ±5%, 500V	1	DM10-330J	72136
C69	CAPACITOR, ELECTROLYTIC, TANTALUM: 2.2 µF, ±10%, 20V	1	150D225X9020A2	56289
C70	CAPACITOR, ELECTROLYTIC, TANTALUM: 4.7 µF, ±20%, 35V	1	150D475X0035B2	56289
C71	Same as C1			
C72	Same as C1			
C73	Same as C1			
C74	Same as C1			
C75	Same as C1			
C76	Same as C1			
C77	Same as C19			
C78	CAPACITOR, DIPPED MICA: .002 µF, 5%, 500V	1	DM19-202J	72136
C79	NOT USED			
C80	Same as C22			
C81	Same as C27			
CR1	DIODE	3	1N462A	80131
CR2	Same as CR1			
CR3	DIODE	1	1N198	80131
CR4	Same as CR1			
E1	FEEDTHRU, TEFLON	4	SFU-16	04013
E2	Same as E1			
E3	Same as E1			
E4	Same as E1			
FB1	FERRITE BEAD	2	56-590-65/4A	02114
FB2	NOT USED			
FB3	Same as FB1			
FL1	FILTER, CRYSTAL: 21.4 Center Frequency, 75 KC bandwidth	1	4065527	74306
FL2	FILTER, CRYSTAL: 21.4 Center Frequency, 20 KC bandwidth	1	4065526	74306
J1	CONNECTOR, RECEPTACLE	2	27-9	74868

REF DESIG PREFIX A8

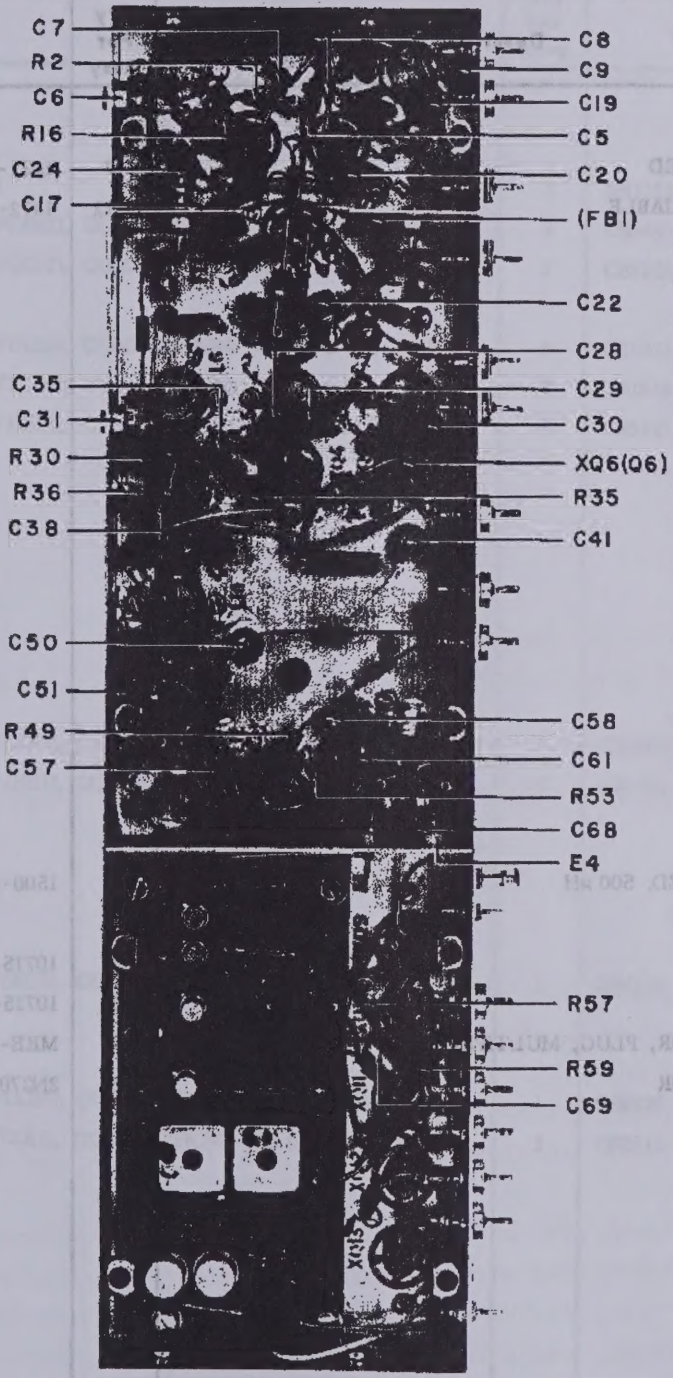
C7
R2
C6
R16
C24
C17
C35
C31
R30
R36
C38
C50
C51
R49
C57
C8
C9
C19
C5
C20
(FB1)
C22
C28
C29
C30
XQ6(Q6)
R35
C41
C58
C61
R53
C68
E4
R57
R59
C69

Figure 5-36. Type 7245 20/75/300 KC Bandwidth IF Strip, Component Locations

REF DESIG PREFIX A8

Ref Desig	Description	Qty Per Assy	Vendor Part No.	Vendor Code
J2	Same as J1			
L1	COIL, FIXED	7	1131-37	14632
L2	COIL, VARIABLE	12	1472-3	14632
L3	Same as L2			
L4	Same as L2			
L5	Same as L2			
L6	Same as L2			
L7	Same as L2			
L8	Same as L1			
L9	Same as L2			
L10	Same as L2			
L11	Same as L1			
L12	Same as L2			
L13	Same as L2			
L14	Same as L1			
L15	Same as L2			
L16	Same as L2			
L17	Same as L1			
L18	Same as L1			
L19	COIL, FIXED, 500 μH	1	1500-15	99848
L20	Same as L1			
MP1	COVER	1	10715-1	14632
MP2	COVER	1	10715-2	14632
P1	CONNECTOR, PLUG, MULTIPIN	1	MRE-18P-G	81312
Q1	TRANSISTOR	8	2N2708	80131
Q2	Same as Q1			
Q3	Same as Q1			
Q4	Same as Q1			
Q5	Same as Q1			
Q6	Same as Q1			
Q7	Same as Q1			
Q8	Same as Q1			
Q9	TRANSISTOR	4	2N697	80131
Q10	Same as Q9			

REF DESIG PREFIX A8

Ref Desig	Description	Qty Per Assy	Vendor Part No.	Vendor Code
Q11	Same as Q9			
Q12	Same as Q9			
Q13	TRANSISTOR	1	2N1131	80131
R1	RESISTOR, FIXED, COMPOSITION: 24 Ω, ±5%, 1/4W	3	CB2405	01121
R2	RESISTOR, FIXED, COMPOSITION: 33 Ω, ±5%, 1/4W	1	CB3305	01121
R3	Same as R1			
R4	RESISTOR, FIXED, COMPOSITION: 100 Ω, ±5%, 1/4W	6	CB1015	01121
R5	RESISTOR, FIXED, COMPOSITION: 15 kΩ, ±5%, 1/4W	7	CB1535	01121
R6	RESISTOR, FIXED, COMPOSITION: 5.1 kΩ, ±5%, 1/4W	9	CB5125	01121
R7	Same as R4			
R8	Same as R5			
R9	Same as R6			
R10	Same as R5			
R11	Same as R6			
R12	Same as R4			
R13	Same as R4			
R14	RESISTOR, FIXED, COMPOSITION: 1 kΩ, ±5%, 1/4W	7	CB1025	01121
R15	RESISTOR, FIXED, COMPOSITION: 47 Ω, ±5%, 1/4W	9	CB4705	01121
R16	Same as R14			
R17	Same as R15			
R18	Same as R14			
R19	Same as R15			
R20	RESISTOR, FIXED, COMPOSITION: 22 Ω, ±5%, 1/4W	2	CB2205	01121
R21	Same as R1			
R22	NOT USED			
R23	RESISTOR, FIXED, COMPOSITION: 8.2 kΩ, ±5%, 1/4W	1	CB8225	01121
R24	RESISTOR, FIXED, COMPOSITION: 750 Ω, ±5%, 1/4W	2	CB7515	01121
R25	Same as R4			
R26	Same as R6			
R27	Same as R24			
R28	Same as R5			
R29	Same as R6			
R30	Same as R5			
R31	Same as R6			

REF DESIG PREFIX A8

Ref Desig	Description	Qty Per Assy	Vendor Part No.	Vendor Code
R32	Same as R5			
R33	Same as R6			
R34	Same as R20			
R35	Same as R14			
R36	Same as R20			
R37	Same as R14			
R38	Same as R14			
R39	Same as R15			
R40	Same as R15			
R41	Same as R15			
R42	Same as R4			
R43	Same as R5			
R44	Same as R6			
R45	RESISTOR, FIXED, COMPOSITION: 470 Ω, ±5%, 1/4W	2	CB4715	01121
R46	RESISTOR, FIXED, COMPOSITION: 10 Ω, 5%, 1/4W	1	CB1005	01121
R47	Same as R14			
R48	Same as R15			
R49	RESISTOR, FIXED, COMPOSITION: 12 kΩ, ±5%, 1/4W	1	CB1235	01121
R50	Same as R6			
R51	Same as R15			
R52	Same as R45			
R53	Same as R15			
R54	RESISTOR, FIXED, COMPOSITION: 22 kΩ, ±5%, 1/4W	1	CB2235	01121
R55	RESISTOR, FIXED, COMPOSITION: 47 kΩ, ±5%, 1/4W	1	CB4735	01121
R56	RESISTOR, FIXED, COMPOSITION: 330 kΩ, ±5%, 1/4W	1	CB3345	01121
R57	RESISTOR, FIXED, COMPOSITION: 10 kΩ, ±5%, 1/4W	1	CB1035	01121
R58	RESISTOR, FIXED, COMPOSITION: 33 kΩ, 5%, 1/4W	2	CB3335	01121
R59	Same as R58			
R60	RESISTOR, FIXED, COMPOSITION: 1.5 kΩ, 5%, 1/4W	1	CB1525	01121
R61	RESISTOR, FIXED, COMPOSITION: 11 kΩ, 5%, 1/4W	2	CB1135	01121
R62	RESISTOR, FIXED, COMPOSITION: 910 Ω, 5%, 1/4W	1	CB9115	01121
R63	RESISTOR, FIXED, COMPOSITION: 2.7 kΩ, 5%, 1/4W	1	CB2725	01121
R64	RESISTOR, FIXED, COMPOSITION: 100 kΩ, 5%, 1/4W	1	CB1045	01121
R65	RESISTOR, FIXED, COMPOSITION: 220 Ω, 5%, 1/4W	1	CB2215	01121

REF DESIG PREFIX A8

Ref Desig	Description	Qty Per Assy	Vendor Part No.	Vendor Code
R66	Same as R61			
R67	RESISTOR, FIXED, COMPOSITION: 24 kΩ, 5%, 1/4W	1	CB2435	01121
R68	NOT USED			
R69	RESISTOR, FIXED, COMPOSITION: 470 Ω, 5%, 1/4W	1	CB4715	01121
XQ1	SOCKET, TRANSISTOR	8	22-16-4	81073
XQ2	Same as XQ1			
XQ3	Same as XQ1			
XQ4	Same as XQ1			
XQ5	Same as XQ1			
XQ6	Same as XQ1			
XQ7	Same as XQ1			
XQ8	Same as XQ1			
XQ9	SOCKET, TRANSISTOR	5	22-16-3	81073
XQ10	Same as XQ9			
XQ11	Same as XQ9			
XQ12	Same as XQ9			
XQ13	Same as XQ9			

5.4.9.1 Part 10710 FM Demodulator Module

REF DESIG PREFIX A8A1

Ref Desig	Description	Qty Per Assy	Vendor Part No.	Vendor Code
C1	CAPACITOR, CERAMIC, DISC: .005 μF, ± 20%, 500V	4	SM (.005μF, ± 20%)	91418
C2	CAPACITOR, CERAMIC, DISC: 1000 pF, GMV, 500V	4	SM (1000 pF, GMV)	91418
C3	Same as C2			
C4	Same as C2			
C5	Same as C2			
C6	Same as C1			
C7	CAPACITOR, DIPPED MICA: 15 pF, ± 5%, 500V	1	DM10-150J	72136
C8	CAPACITOR, DIPPED MICA: 20 pF, ± 5%, 500V	1	DM10-200J	72136
C9	CAPACITOR, DIPPED MICA: 75 pF, ± 5%, 500V	2	DM10-750J	72136
C10	Same as C9			
C11	CAPACITOR, DIPPED MICA: 33 pF, ± 5%, 500V	1	DM10-330J	72136
C12	Same as C1			
C13	Same as C1			
CR1	DIODE	4	1N198	80131
CR2	DIODE, ZENER	1	1N753A	80131
CR3	Same as CR1			
CR4	Same as CR1			
CR5	Same as CR1			
L1	INDUCTOR, FIXED	1	1131-41	14632
L2	INDUCTOR, FIXED	1	1131-40	14632
L3	INDUCTOR, VARIABLE	1	3476-20	14632
Q1	TRANSISTOR	4	2N706	80131
Q2	Same as Q1			
Q3	Same as Q1			
Q4	Same as Q1			
Q5	TRANSISTOR	2	2N697	80131
Q6	Same as Q5			
R1	RESISTOR, FIXED, COMPOSITION: 5.1kΩ, ± 5%, 1/4W	5	CB5125	01121
R2	RESISTOR, FIXED, COMPOSITION: 12kΩ, ± 5%, 1/4W	5	CB1235	01121
R3	RESISTOR, FIXED, COMPOSITION: 1kΩ, ±5%, 1/4W	1	CB1025	01121
R4	Same as R1			
R5	Same as R2			
R6	RESISTOR, FIXED, COMPOSITION: 47 Ω, ± 5%, 1/4W	2	CB4705	01121
R7	Same as R2			

REF DESIG PREFIX A8A1

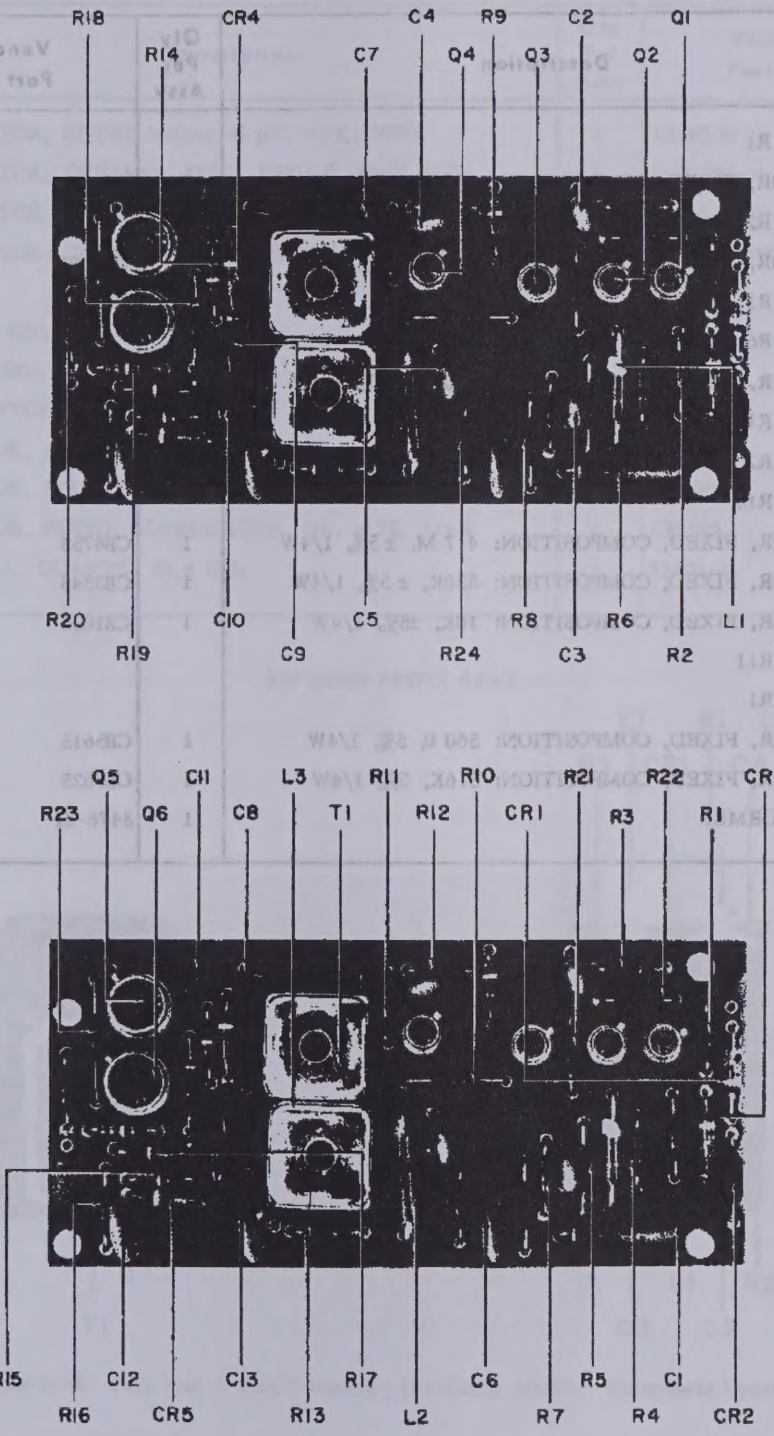
R18
CR4
C4
R9
C2
Q1
R14
C7
Q4
Q3
Q2
R20
C10
C5
R8
R6
L1
R19
C9
R24
C3
R2
Q5
C11
L3
R11
R10
R21
R22
CR3
R23
Q6
C8
T1
R12
CR1
R3
R1
R15
C12
C13
R17
C6
R5
C1
R16
CR5
R13
L2
R7
R4
CR2

Figure 5-37. Part 10710 FM Demodulator Module, Component Locations

REF DESIG PREFIX A8A1

Ref Desig	Description	Qty Per Assy	Vendor Part No.	Vendor Code
R8	Same as R1			
R9	RESISTOR, FIXED, COMPOSITION: 390 Ω, ±5%, 1/4W	1	CB3915	01121
R10	Same as R2			
R11	RESISTOR, FIXED, COMPOSITION: 22 Ω, ±5%, 1/4W	2	CB2205	01121
R12	Same as R1			
R13	Same as R6			
R14	RESISTOR, FIXED, COMPOSITION: 100K, ±5%, 1/4W	3	CB1045	01121
R15	Same as R14			
R16	Same as R2			
R17	Same as R14			
R18	RESISTOR, FIXED, COMPOSITION: 4.7 M, ±5%, 1/4W	1	CB4755	01121
R19	RESISTOR, FIXED, COMPOSITION: 330K, ±5%, 1/4W	1	CB3345	01121
R20	RESISTOR, FIXED, COMPOSITION: 10K, ±5%, 1/4W	1	CB1035	01121
R21	Same as R11			
R22	Same as R1			
R23	RESISTOR, FIXED, COMPOSITION: 560 Ω, 5%, 1/4W	1	CB5615	01121
R24	RESISTOR, FIXED, COMPOSITION: 5.6K, 5%, 1/4W	1	CB5625	01121
T1	TRANSFORMER	1	3476-21	14632

5.4.9.2 Part 1769-3 Beat Frequency Oscillator Module

REF DESIG PREFIX A8A2

Ref Desig	Description	Qty Per Assy	Vendor Part No.	Vendor Code
C1	CAPACITOR, DIPPED MICA: 43 pF, ±5%, 500V	1	DM10-430J	72136
C2	CAPACITOR, CERAMIC, DISC: 1000 pF, GMV, 500V	1	SM(.001μF, GMV)	91418
C3	CAPACITOR, DIPPED MICA: 68 pF, ±5%, 500V	1	DM10-680J	72136
C4	CAPACITOR, CERAMIC, FEEDTHRU: 1000 pF, GMV, 500V	1	FA5C-102W	01121
CR1	DIODE	2	1N462A	80131
CR2	Same as CR1			
E1	FEEDTHRU, INSULATED	1	SFU-16	04013
Q1	TRANSISTOR	1	2N706	80131
R1	RESISTOR, FIXED, COMPOSITION: 47k, ±5%, 1/4W	1	CB4735	01121
R2	RESISTOR, FIXED, COMPOSITION: 240k, ±5%, 1/4W	1	CB2445	01121
R3	RESISTOR, FIXED, COMPOSITION: 10k, ±5%, 1/4W	1	CB1035	01121
Y1	CRYSTAL, QUARTZ: 21.4 MHz	1	91803-1	14632

REF DESIG PREFIX A8A2

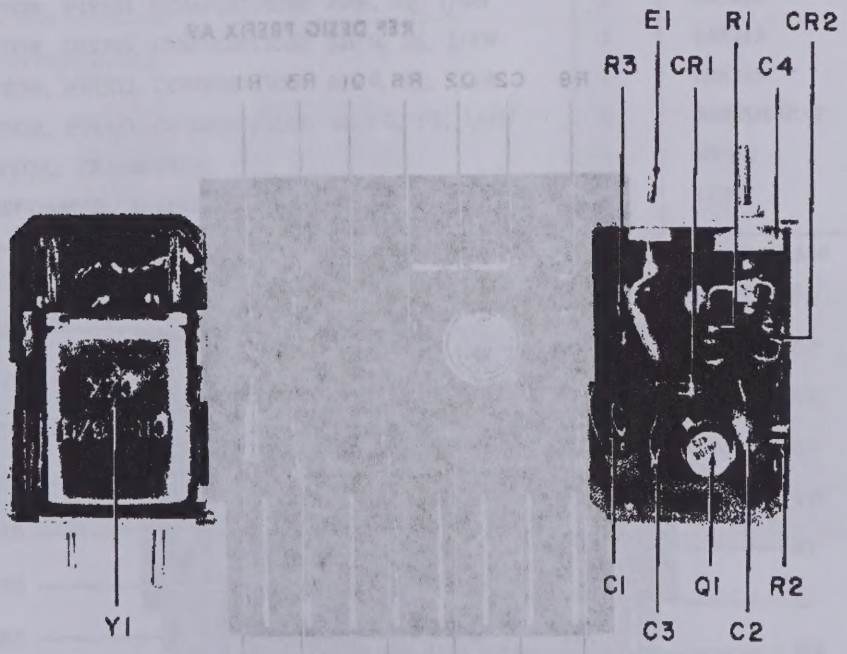

Figure 5-38. Part 1769-3 Beat Frequency Oscillator Module, Component Locations

5.4.10 Type 7312 Video Amplifier

REF DESIG PREFIX A9

Ref Desig	Description	Qty Per Assy	Vendor Part No.	Vendor Code
C1	CAPACITOR, ELECTROLYTIC: 1.0 μF, ±20%, 35V	1	150D105X0035A2	56289
C2	CAPACITOR, ELECTROLYTIC: 10 μF, ±20%, 20V	1	150D106X0020B2	56289
Q1	TRANSISTOR	1	2N697	80131
Q2	TRANSISTOR	1	2N526	80131
R1	RESISTOR, FIXED, COMPOSITION: 1k, ±5%, 1/4W	2	CB1025	01121
R2	RESISTOR, FIXED, COMPOSITION: 220k, ±5%, 1/4W	1	CB2245	01121
R3	RESISTOR, FIXED, COMPOSITION: 20k, ±5%, 1/4W	1	CB2035	01121
R4	Same as R1			
R5	RESISTOR, FIXED, COMPOSITION: 160 Ω, ±5%, 1/4W	2	CB1615	01121
R6	RESISTOR, FIXED, COMPOSITION: 2k, ±5%, 1/4W	1	CB2025	01121
R7	Same as R5			
R8	RESISTOR, FIXED, COMPOSITION: 47 Ω, ±5%, 1/4W	1	CB4705	01121
R9	RESISTOR, FIXED, COMPOSITION: 100k, ±5%, 1/4W	1	CB1045	01121

REF DESIG PREFIX A9

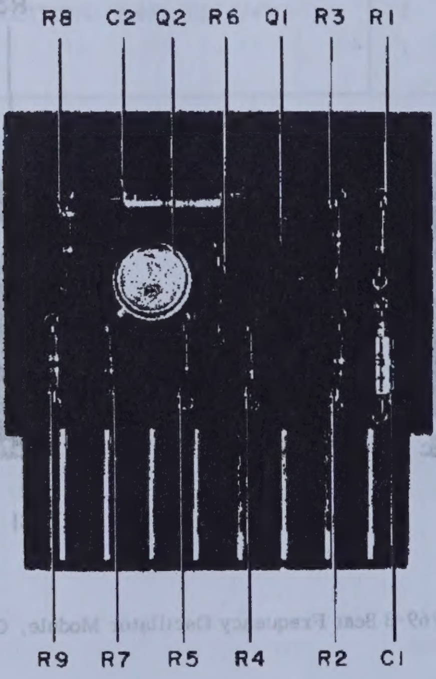

Figure 5-39. Type 7312 Video Amplifier, Component Locations

REF. DESIG PREFIX A10

5.4.11 Type 7400B Audio Amplifier

Ref Desig	Description	Qty Per Assy	Vendor Part No.	Vendor Code
C1	CAPACITOR, ELECTROLYTIC TANTALUM: 0.47 µF, 10%, 35V	1	150D474X9035A2	56289
C2	CAPACITOR, ELECTROLYTIC TANTALUM: 10 µF, 10%, 20V	1	150D106X9020B2	56289
CR1	DIODE, ZENER	1	1N759A	80131
Q1	TRANSISTOR	1	2N929	80131
Q2	TRANSISTOR	2	2N2270	80131
Q3	Same as Q2			
R1	RESISTOR, FIXED, COMPOSTION: 10k, 5%, 1/4W	1	CB1035	01121
2	RESISTOR, FIXED, CARBON FILM: 75k, 1%, 1/4W	1	RN60D7502F	81349
R3	RESISTOR, FIXED, CARBON FILM: 10k, 1%, 1/4W	1	RN60D1002F	81349
R4	RESISTOR, FIXED, COMPOSITION: 6.2k, 5%, 1/4W	1	CB6225	01121
R5	RESISTOR, FIXED, CARBON FILM: 619 Ω, 1%, 1/4W	1	RN60D6190F	81349
R6	RESISTOR, FIXED, COMPOSITION: 3.9k, 5%, 1/4W	1	CB3925	01121
R7	RESISTOR, FIXED, COMPOSITION: 100k, 5%, 1/4W	1	CB1045	01121
R8	RESISTOR, FIXED, COMPOSITION: 820 Ω, 5%, 1/4W	1	CB8215	01121
R9	RESISTOR, FIXED, COMPOSITION: 620 Ω, 5%, 1/4W	1	CB6215	01121
R10	RESISTOR, FIXED, CARBON FILM: 68.1 Ω, 1%, 1/4W	1	RN60D68R1F	81349
RA1	RADIATOR, TRANSISTOR	1	NF207	05820
T1	TRANSFORMER, AUDIO OUTPUT	1	1170	14632

REF DESIG PREFIX A10

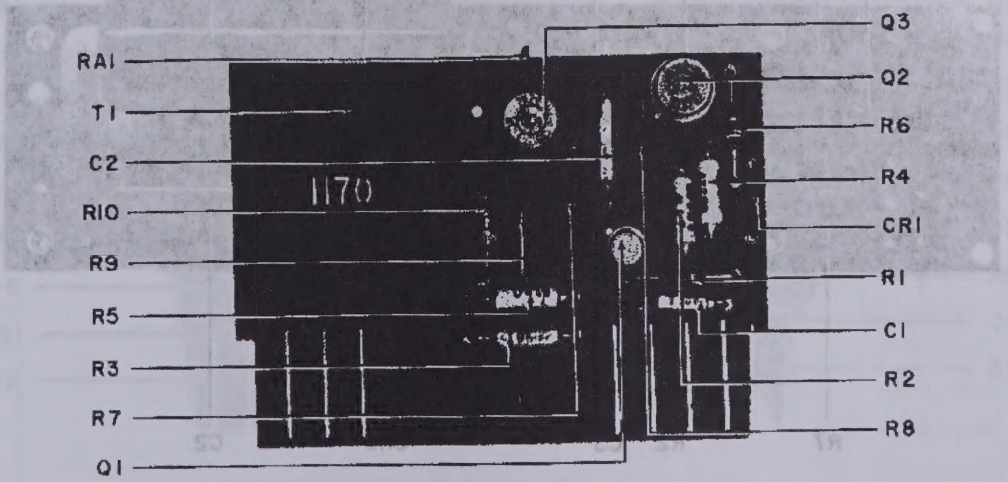

Figure 5-40. Type 7400B Audio Amplifier, Component Locations

5.4.12 Type 7633 Power Supply Regulator (CRT)

REF DESIG PREFIX A11

Ref Desig	Description	Qty Per Assy	Vendor Part No.	Vendor Code
C1	CAPACITOR, PAPER, TUBULAR: 0.1 μF, 10%, 1000V	2	10TM-P10	56289
C2	Same as C1			
C3	CAPACITOR, CERAMIC, DISC: 0.1 μF, +80,-20%, 100V	1	TA(0.1μF,+80,-20%)	91418
CR1	DIODE, RECTIFIER	2	SC20	14099
CR2	Same as CR1			
P1	CONNECTOR, PLUG: 9 Pin	1	MRE-9P-G	81312
R1	RESISTOR, FIXED, COMPOSITION: 750k, 5%, 1/2W	1	EB7545	01121
R2	RESISTOR, FIXED, COMPOSITION: 100k, 5%, 1/2W	1	EB1045	01121
R3	RESISTOR, VARIABLE, COMPOSITION: 500k, 1/2W	1	70-08459	37942
R4	RESISTOR, FIXED, COMPOSITION: 4.7 M, 5%, 1/2W	1	EB4755	01121
R5	RESISTOR, VARIABLE, COMPOSITION: 2.5 M, 1/2W	1	70-08458	37942
R6	RESISTOR, FIXED, COMPOSITION: 6.8 M, 5%, 1/2W	2	EB6855	01121
R7	Same as R6			
V1	ELECTRON, TUBE: Gas	1	GV3A-1200	63060

REF DESIG PREFIX A11

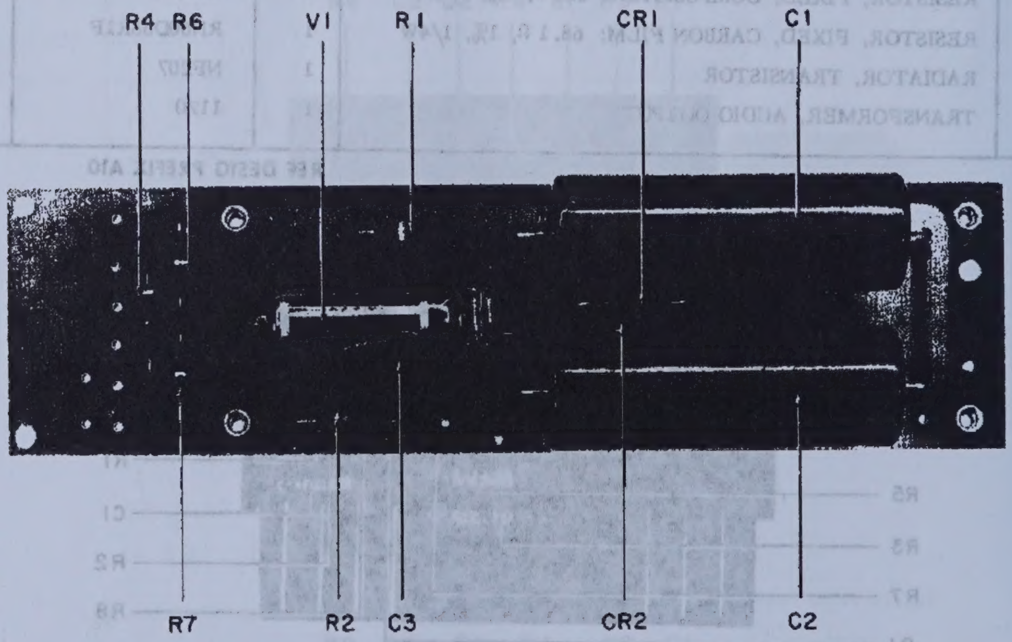

Figure 5-41. Type 7633 Power Supply Regulator (CRT), Component Locations

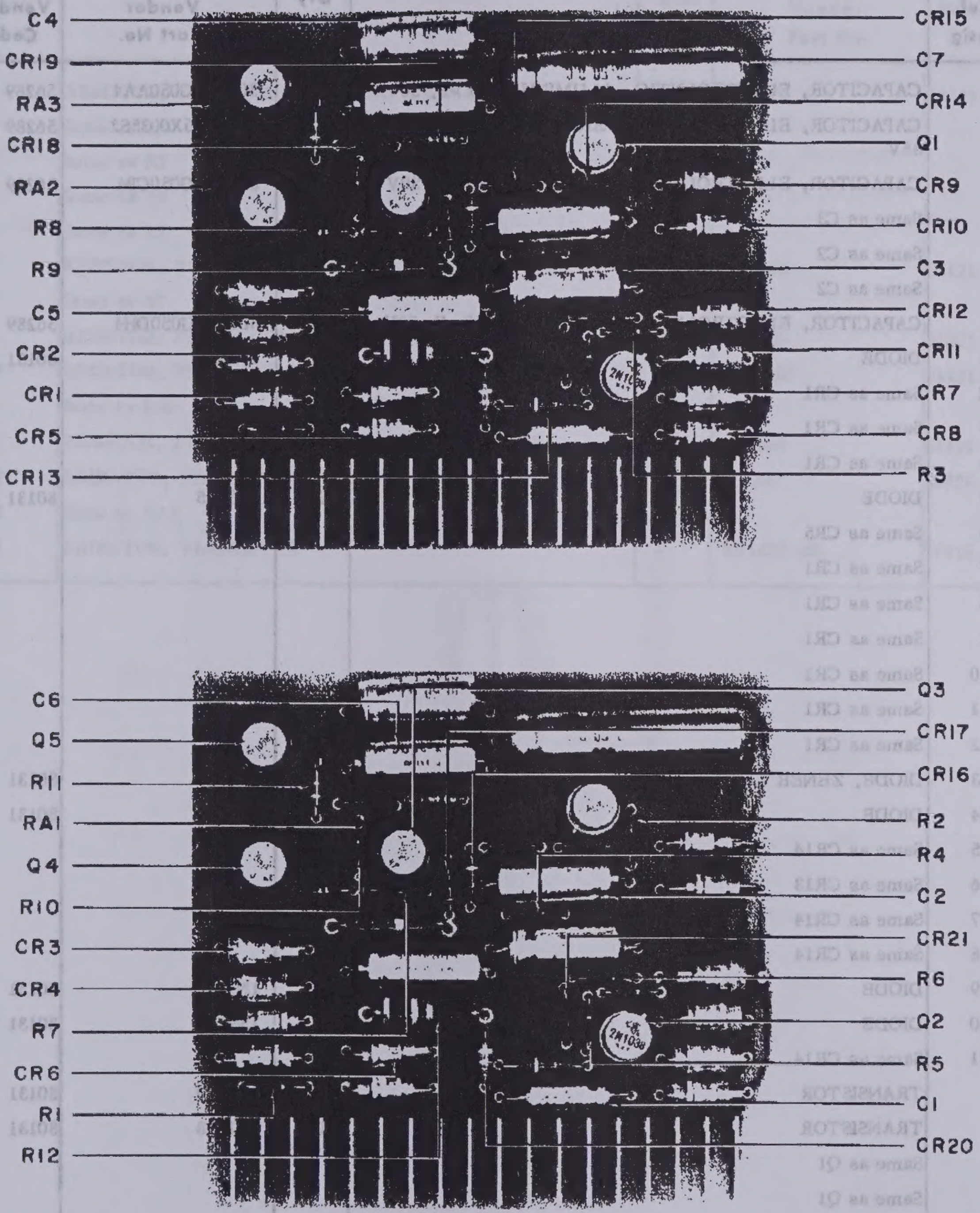
C4
CR19
RA3
CR18
RA2
R8
R9
C5
CR2
CR1
CR5
CR13
CR15
C7
CR14
Q1
CR9
CR10
C3
CR12
CR11
CR7
CR8
R3
C6
Q5
R11
RA1
Q4
R10
CR3
CR4
R7
CR6
R1
R12
Q3
CR17
CR16
R2
R4
C2
CR21
R6
Q2
R5
C1
CR20
2N1038

Figure 5-42. Type 7631A Power Supply Regulator (GEN), Component Locations

5.4.13 Type 7631A Power Supply Regulator (Gen.)

REF DESIG PREFIX A12

Ref Desig	Description	Qty Per Assy	Vendor Part No.	Vendor Code
C1	CAPACITOR, ELECTROLYTIC, ALUMINUM : 1 μF, 50V	1	30D105G050AA4	56289
C2	CAPACITOR, ELECTROLYTIC, TANTALUM: 47 μF, ± 20%, 35V	3	150D476X0035S2	56289
C3	CAPACITOR, ELECTROLYTIC, ALUMINUM: 10 μF, 50V	2	30D106G050CB4	56289
C4	Same as C3			
C5	Same as C2			
C6	Same as C2			
C7	CAPACITOR, ELECTROLYTIC, ALUMINUM: 50 μF, 50V	1	30D606G050DH4	56289
CR1	DIODE	10	1N3253	80131
CR2	Same as CR1			
CR3	Same as CR1			
CR4	Same as CR1			
CR5	DIODE	2	1N3255	80131
CR6	Same as CR5			
CR7	Same as CR1			
CR8	Same as CR1			
CR9	Same as CR1			
CR10	Same as CR1			
CR11	Same as CR1			
CR12	Same as CR1			
CR13	DIODE, ZENER	2	1N970B	80131
CR14	DIODE	5	1N462A	80131
CR15	Same as CR14			
CR16	Same as CR13			
CR17	Same as CR14			
CR18	Same as CR14			
CR19	DIODE	1	1N759A	80131
CR20	DIODE	1	1N979A	80131
CR21	Same as CR14			
Q1	TRANSISTOR	4	2N2270	80131
Q2	TRANSISTOR	1	2N1038	80131
Q3	Same as Q1			
Q4	Same as Q1			
Q5	Same as Q1			
R1	RESISTOR, FIXED, COMPOSITION: 10 Ω, ± 5%, 1/4W	2	CB1005	01121

REF DESIG PREFIX A12

Ref Desig	Description	Qty Per Assy	Vendor Part No.	Vendor Code
R2	RESISTOR, FIXED, COMPOSITION: 1 k, ±5%, 1/4W	4	CB1025	01121
R3	Same as R2			
R4	Same as R2			
R5	Same as R2			
R6	Same as R1			
R7	RESISTOR, FIXED, COMPOSITION: 5.1 Ω, ±5%, 1/4W	2	CB51G5	01121
R8	Same as R7			
R9	RESISTOR, FIXED, COMPOSITION: 62 Ω, ±5%, 1W	1	GB6205	01121
R10	RESISTOR, FIXED, COMPOSITION: 2.4 k, ±5%, 1/4W	2	CB2425	01121
R11	Same as R10			
R12	RESISTOR, FIXED, COMPOSITION: 36 k, ±5%, 1W	1	GB3635	01121
RA1	RADIATOR, TRANSISTOR	2	NF207	05820
RA2	Same as RA1			
RA3	RADIATOR, TRANSISTOR	1	3AL635-2R	18915

5.4.14 Type 7917 Coupling Network

REF DESIG PREFIX A13, A14

Ref Desig	Description	Qty Per Assy	Vendor Part No.	Vendor Code
J1	CONNECTOR, RECEPTACLE, BNC	2	UG1094/U	81349
J2	Same as J1			
J3	CONNECTOR, RECEPTACLE, Type "N"	1	UG58A/U	81349
R1	RESISTOR, FIXED, COMPOSITION: 100 Ω, ±5%, 1/4W	2	CB1015	01121
R2	RESISTOR, FIXED, COMPOSITION: 68 Ω, ±5%, 1/4W	2	CB6805	01121
R3	NOT USED			
R4	Same as R2			
R5	Same as R1			

REF DESIG PREFIX A13, A14

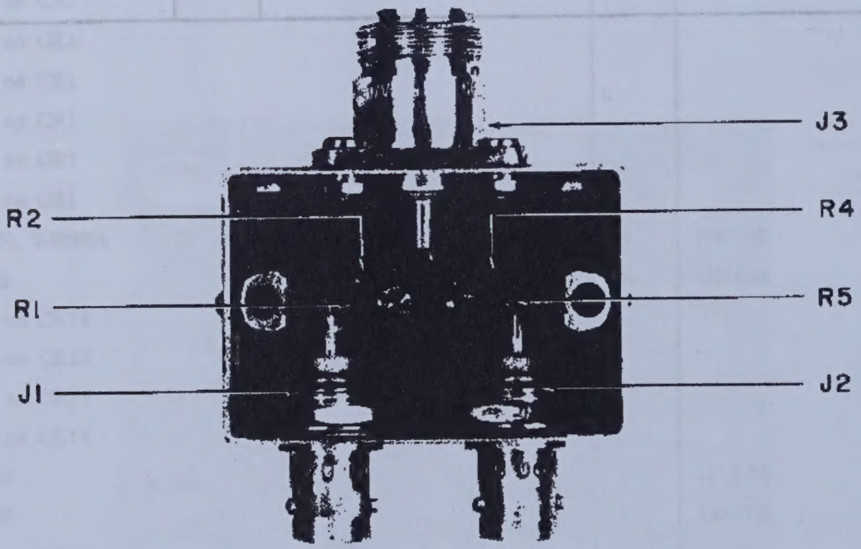

Figure 5-43. Type 7917 Coupling Network, Component Locations

5.4.15 Type 7836 AGC Monitor Amplifier

REF DESIG PREFIX A15

Ref Desig	Description	Qty Per Assy	Vendor Part No.	Vendor Code
CR1	DIODE, ZENER	1	1N759A	80131
CR2	DIODE, ZENER	1	1N753A	80131
Q1	TRANSISTOR	1	2N929	80131
Q2	TRANSISTOR	1	2N3251	80131
R1	RESISTOR, FIXED, COMPOSITION: 470k, 5%, 1/4W	1	CB4745	01121
R2	RESISTOR, FIXED, COMPOSITION: 220k, 5%, 1/4W	1	CB2245	01121
R3	RESISTOR, VARIABLE, FILM: 500k, 30%, 1/2W	1	62PR500K	73138
R4	RESISTOR, FIXED, COMPOSITION: 100k, 5%, 1/4W	1	CB1045	01121
R5	RESISTOR, FIXED, COMPOSITION: 12k, 5%, 1/4W	1	CB1235	01121
R6	RESISTOR, FIXED, COMPOSITION: 1k, 5%, 1/4W	1	CB1025	01121
R7	RESISTOR, FIXED, COMPOSITION: 5.1k, 5%, 1/4W	1	CB5125	01121
R8	RESISTOR, FIXED, COMPOSITION: 2.4k, 5%, 1/4W	1	CB2425	01121

REF DESIG PREFIX A15

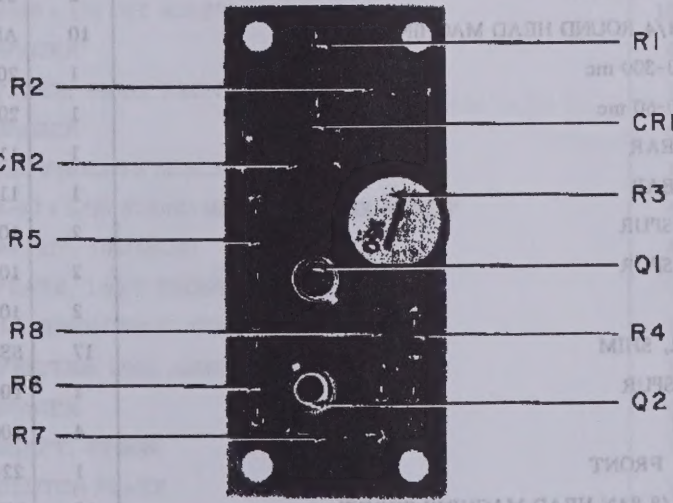

Figure 5-44. Type 7836 AGC Monitor Amplifier, Component Locations

Ref Desig	Description		Qty Per Assy	Vendor Part No.	Vendor Code
1	CRANK STUD	Part of 1914-1	REF	1027-1	14632
2	CRANK	Part of 1914-1	REF	1026-1	14632
3	KNOB, MODIFIED	Part of 1914-1	REF	1028-1	14632
4	SHAFT		1	1002-2	14632
5	FRONT PANEL		REF	4474	14632
6	WINDOW		REF	1052	14632
7	MASK		1	1773	14632
8	MASK		1	1029	14632
9	SLIDE		1	1007-2	14632
10	SLIDE		1	1007-1	14632
11	4-40 x 3/8 PAN HEAD MACHINE SCREW		8	MS35233-15	96906
12	RACK SPACER		1	1010-1	14632
13	RACK		1	1011	14632
14	DRIVE SHAFT ASSEMBLY		1	1009-2	14632
15	SHAFT		1	1002-1	14632
16	RETAINING RING		2	3100-25	97464
17	4-40 x 1/4 ROUND HEAD MACHINE SCREW		10	AN515C-4-4	88044
18	DIAL, 60-300 mc		1	2024-1	14632
19	DIAL, 30-60 mc		1	2011-2	14632
20	DIAL GEAR		1	1152-1	14632
21	DIAL GEAR		1	1152-2	14632
22	GEAR, SPUR		2	1015-3	14632
23	GEAR, SPUR		2	1015-5	14632
24	SHAFT		2	1002-28	14632
25	SPACER, SHIM		17	SSS-33	01351
26	GEAR, SPUR		1	1015-2	14632
27	SPACER		4	1005-1	14632
28	PLATE, FRONT		1	2287-2	14632
29	6-32 x 3/8 PAN HEAD MACHINE SCREW		10	MS35233-28	96906
30	#6 SPLIT LOCK WASHER		6	MS35338-79	96906
31	SHAFT		3	1002-21	14632
32	#4 NUT, HEXHEAD		4	MS35649-44	96906
33	#4 SPLIT LOCK WASHER		6	MS35338-78	96906
34	BEARING		16	SFR-1883MM	83086
35	LAMPHOLDER PLATE		2	1174	14632

Ref Desig	Description	Qty Per Assy	Vendor Part No.	Vendor Code
1	CRANK STUD Part of 1914-1	REF	1027-1	14632
2	CRANK Part of 1914-1	REF	1026-1	14632
3	6-32 x 3/8 PAN HEAD MACHINE SCREW	REF	MS35233-28	96906
4	#6 SPLIT LOCK WASHER	21	MS35338-79	96906
5	KNOB, MODIFIED Part of 1914-1	REF	1028-1	14632
6	WINDOW	REF	1052	14632
7	MASK	2	1773	14632
8	4-40 x 1/4 FLAT HEAD MACHINE SCREW	4	MS35249-20	96906
9	DRIVE SHAFT	2	1646-3	14632
10	RETAINING RING	3	3100-25	97464
11	2-56 x 1/4 PAN HEAD MACHINE SCREW	4	MS35233-3	96906
12	DIAL, 235-500 mc	1	1735-1	14632
13	DIAL HUB ASSEMBLY	1	1733	14632
14	DIAL, 490-1000 mc	1	1742-1	14632
15	DIAL HUB ASSEMBLY	1	1749	14632
16	GEAR, SPUR	1	1763-1	14632
17	4-40 x 1/8 SET SCREW	18	AN565-AC4-2	88044
18	SPACER	4	1423-1	14632
19	PLATE, RIGHT FRONT	1	10208-2	14632
20	SPACER	8	1144-3	14632
21	LAMPHOLDER BRACKET	1	1765	14632
22	4-40 x 5/16 ROUND HEAD MACHINE SCREW	4	AN515C-4-5	88044
23	#4 NUT, HEXHEAD	4	MS35649-44	96906
24	PLATE, LEFT FRONT	1	10209-2	14632
25	LAMPHOLDER PLATE	1	1174	14632
26	FRICTION DISC ASSEMBLY	1	1642	14632
27	SPACER	2	1685	14632
28	SHAFT, PINION	1	1716	14632
29	CLUTCH PLATE	1	1750	14632
30	CLUTCH PLATE	1	1751	14632
31	SPRING, COMPRESSION	2	C-360-026-0500	92830
32	BUSHING	1	1645	14632
33	CLUTCH PLATE	1	1643	14632
34	CLUTCH PLATE	1	1644	14632
35	BEARING	9	SFR-1883MM	83086

Ref Desig	Description	Qty Per Assy	Vendor Part No.	Vendor Code
36	SPACER	4	1004-1	14632
37	SPACER	1	1053	14632
38	GEAR, SPUR	1	1015-4	14632
39	GEAR, SPUR	1	1015-1	14632
40	BUSHING	2	1054	14632
41	SPRING	2	C480-038-0500	92830
42	CLUTCH PLATE	2	1008	14632
43	CLUTCH PLATE	2	1013	14632
44	FRICTION DISC Part of 1156	2	1153	14632
45	FRICTION DISC GEAR Part of 1156	2	1154	14632
46	GEAR, SPUR	1	1015-8	14632
47	GEAR, SPUR	1	1015-6	14632
48	6-32 x 1/8 SET SCREW	18	AN565-AC6-2	88044
49	GEAR, ANTI-BACKLASH	2	2001	14632
50	4-40 x 1/8 SET SCREW	10	AN565-AC4-2	88044
51	4-40 x 1/4 SET SCREW	4	AN565-AC4-4	88044
52	SPACER	1	1451	14632
53	PLATE, REAR	1	3426	14632
54	4-40 x 1/4 FLAT HEAD MACHINE SCREW	2	MS35249-20	96906
55	#4 FLAT WASHER	4	MS15795-804	96906
56	COUPLING	2	FC-9	18469

Ref Desig	Description	Qty Per Assy	Vendor Part No.	Vendor Code
36	BEARING	2	SFR-33	83086
37	PLATE, LEFT REAR	2	1720	14632
38	#6 NUT, HEXHEAD	5	MS35649-61	96906
39	SPACER	1	1715-4	14632
40	SPACER	1	1714-4	14632
41	PLATE, RIGHT REAR	1	2417	14632
42	BEARING HOUSING	1	1758	14632
43	4-40 x 3/8 ROUND HEAD MACHINE SCREW	2	AN515C-4-6	88044
44	#4 SPLIT LOCK WASHER	5	MS35338-78	96906
45	SPACER, SHIM	6	SSS-33	01351
46	GEAR, ANTI-BACKLASH	1	1761-1	14632
47	FRICTION DISC ASSEMBLY	1	1753	14632
48	SHAFT, PINION	1	1747	14632
49	SHAFT, COUPLING	1	1760	14632
50	4-40 x 3/16 SET SCREW	18	AN565-AC-4-3	88044
51	PANEL, FRONT	REF	4474	14632
52	GEAR, ANTI-BACKLASH	REF	1761-1	14632
53	SHAFT, INDUCTUNER	REF	1271-1	14632
54	6-32 x 1/4 PAN HEAD MACHINE SCREW	18	MS35233-26	96906
55	#2 FLAT WASHER	4	MS15795-802	96906
56	#2 SPLIT LOCK WASHER	4	MS35338-77	96906
57	#4 FLAT WASHER	2	MS15795-804	96906
58	4-40 x 3/16 PAN HEAD MACHINE SCREW	8	MS35233-12	96906

SECTION VI

SCHEMATIC DIAGRAMS

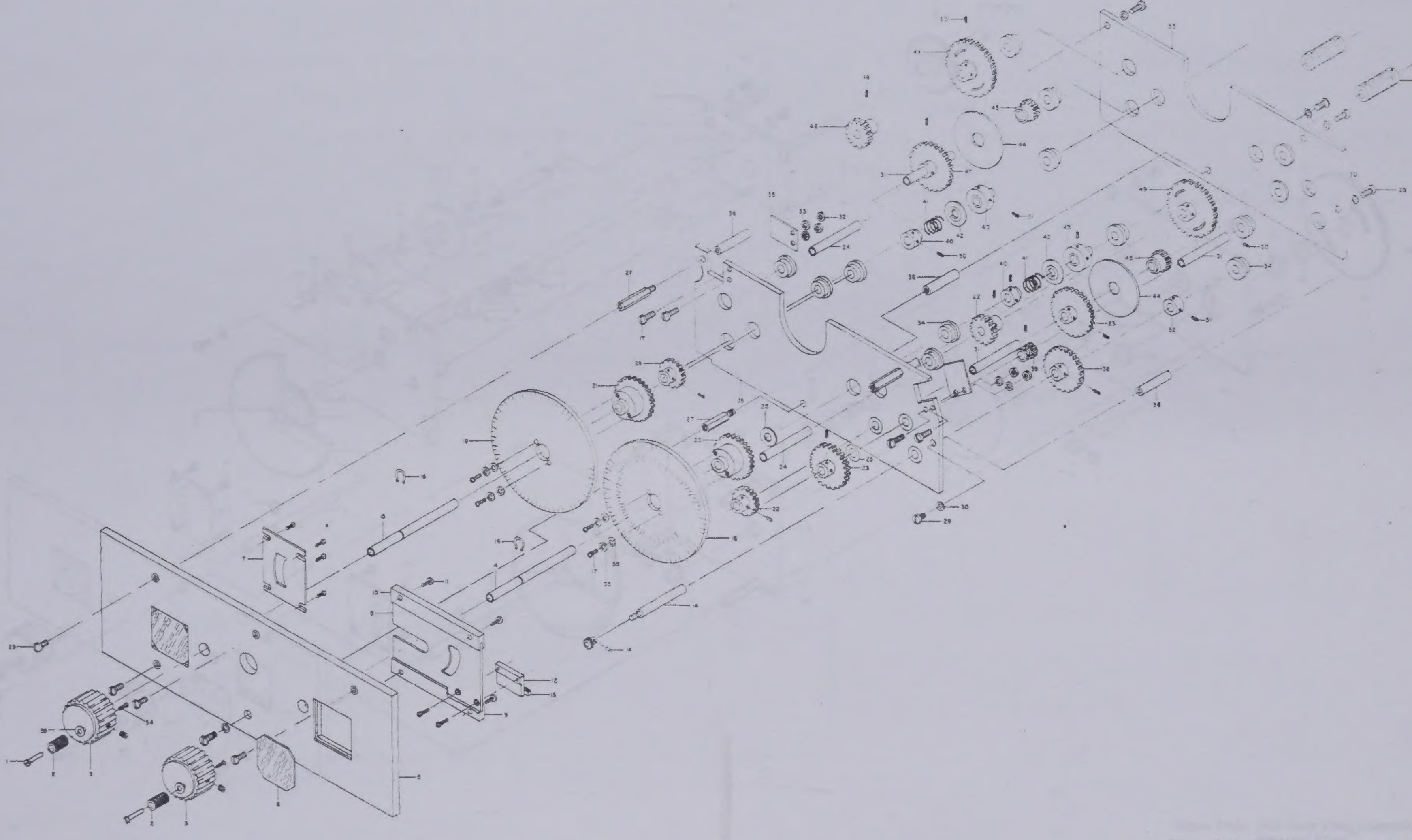
1
2
3
2
3
58
54
6
5
29
7
15
10
8
11
4
12
13
9
14
16
15
17
33
59
19
18
21
26
27
17
20
22
23
24
25
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Figure 5-45. VHF Gear Train Assembly, Exploded View

SECTION VI

SCHEMATIC DIAGRAMS

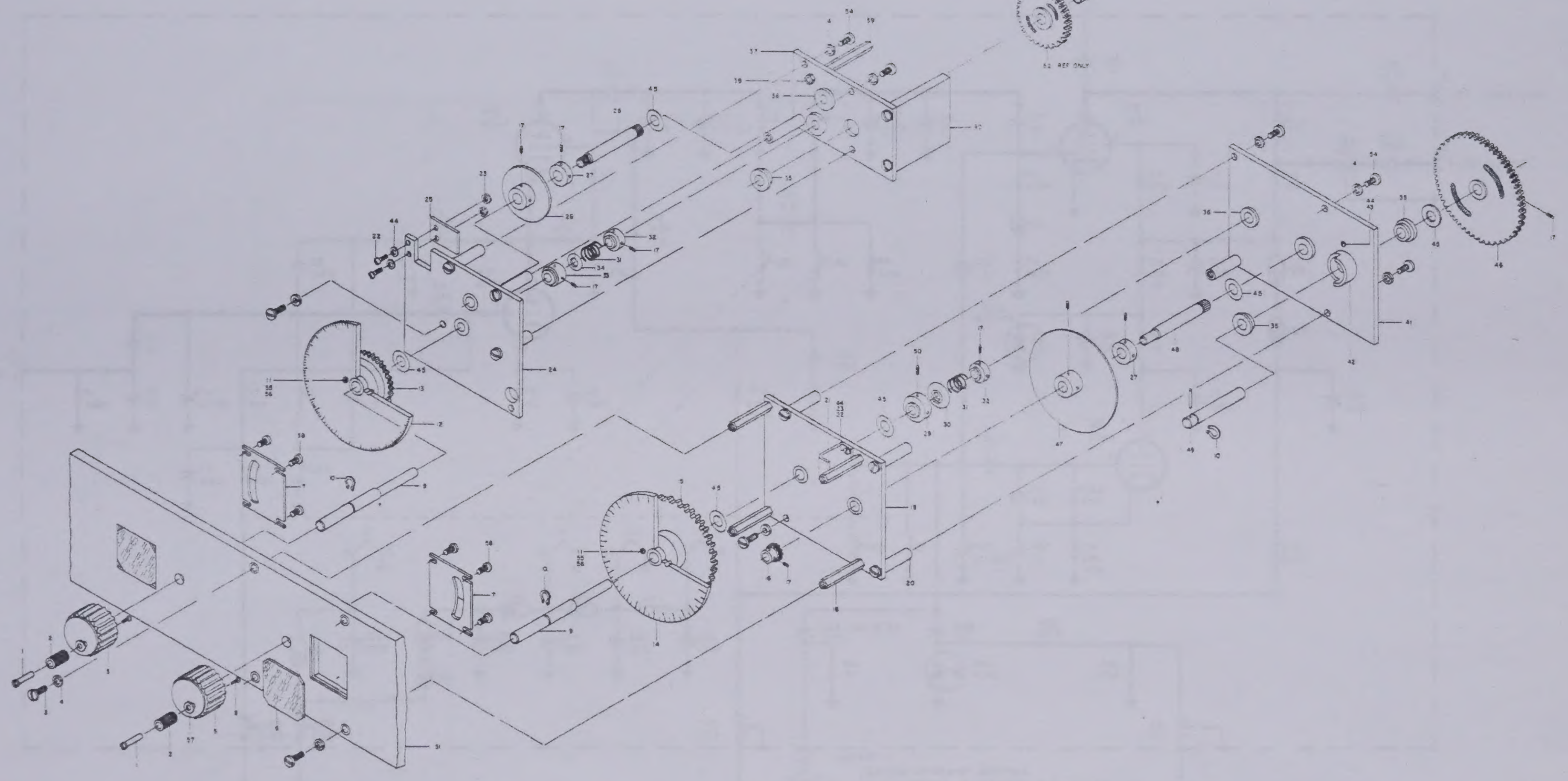
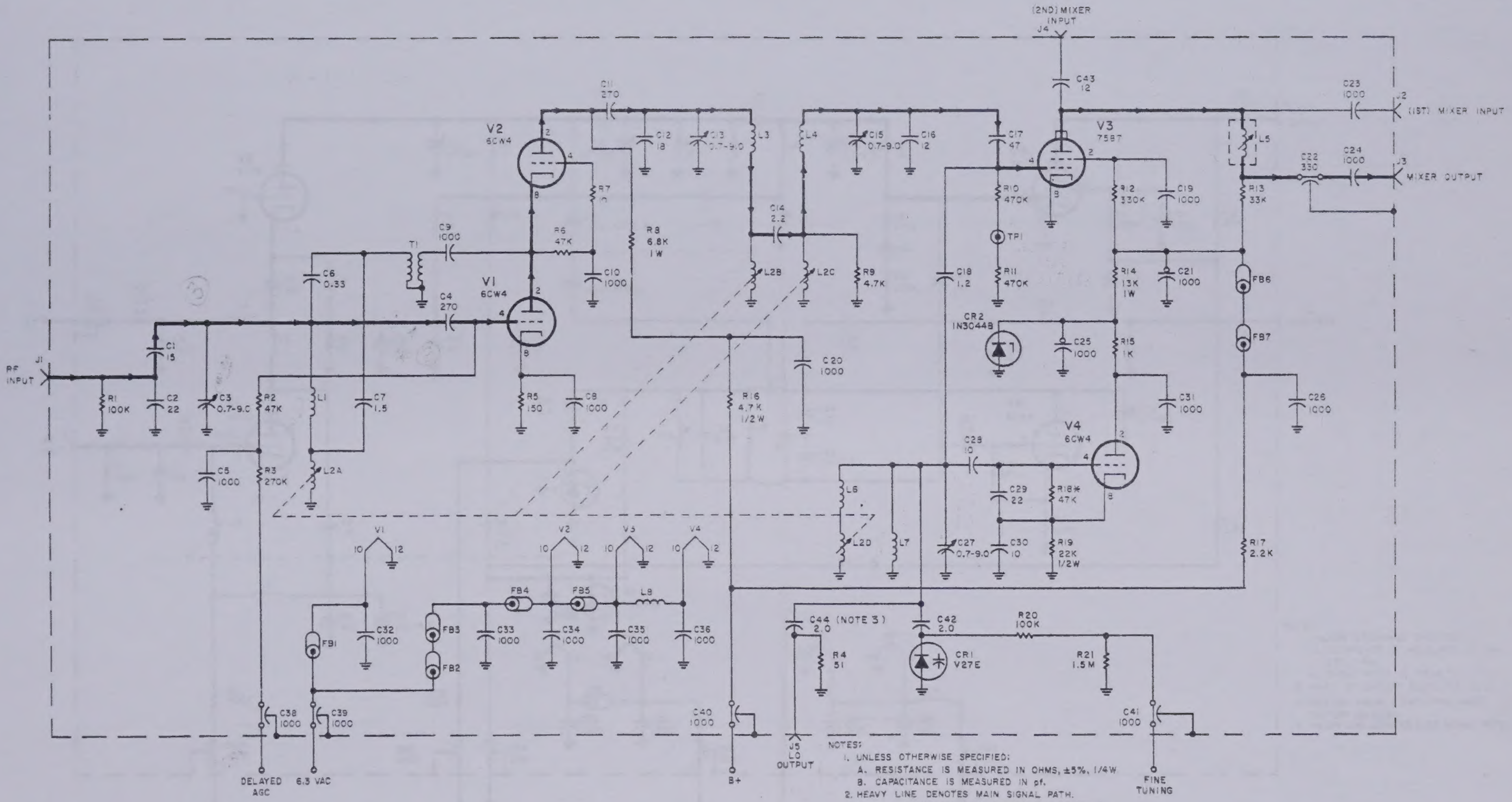

50
53 REF ONLY
52 REF ONLY

Figure 5-46. UHF Gear Train Assembly,
Exploded View

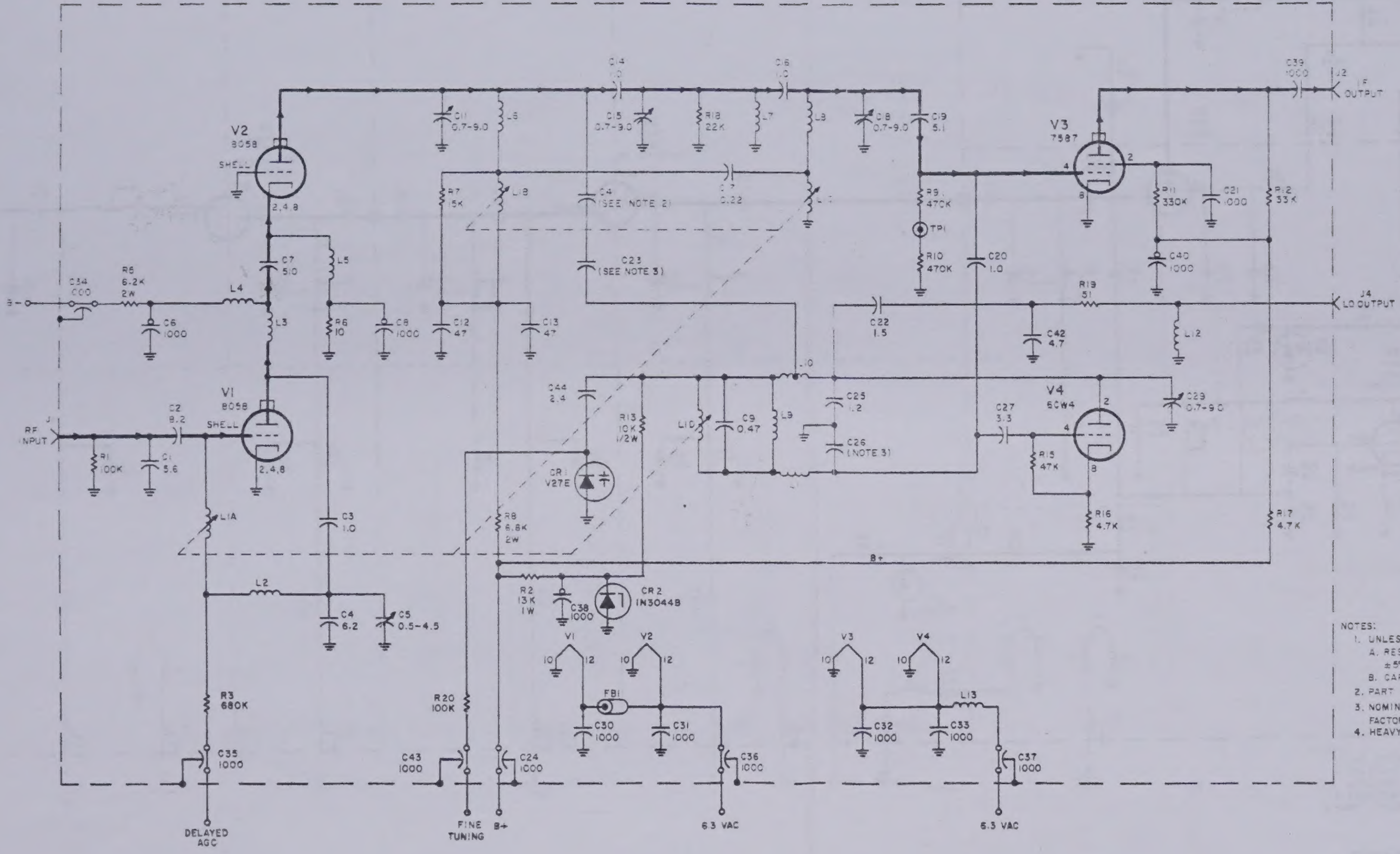
REF DESIG PREFIX A1


(2ND) MIXER INPUT
J4
C43 12
C23 1000
J2
(1ST) MIXER INPUT
J3
MIXER OUTPUT
C22 330
C24 1000
L5
V3 7587
C11 270
V2 6CW4
C12 18
C13 0.7-9.0
L3
L4
C15 0.7-9.0
C16 12
C17 47
R7 10
R8 6.8K 1W
C14 2.2
R10 470K
TP1
R11 470K
R12 330K
C19 1000
R13 33K
C9 1000
T1
R6 47K
C10 1000
C6 0.33
V1 6CW4
C4 270
L2B
L2C
R9 4.7K
C18 1.2
R14 13K 1W
C21 1000
FB6
FB7
CR2 1N3044B
C25 1000
R15 1K
J1
RF INPUT
C1 15
R1 100K
C2 22
C3 0.7-9.0
R2 47K
L1
C7 1.5
R5 150
C8 1000
R16 4.7K 1/2W
C20 1000
C31 1000
C26 1000
V4 6CW4
C28 10
C5 1000
R3 270K
L2A
L6
C29 22
R18* 47K
L2D
L7
C27 0.7-9.0
C30 10
R19 22K 1/2W
R17 2.2K
V1 10 12
V2 10 12
V3 10 12
V4 10 12
FB4
FB5
L8
FB1
C32 1000
FB3
C33 1000
C34 1000
C35 1000
C36 1000
FB2
C44 (NOTE 3) 2.0
R4 51
C42 2.0
CR1 V27E
R20 100K
R21 1.5M
C38 1000
C39 1000
C40 1000
C41 1000
DELAYED AGC
6.3 VAC
B+
J5 LO OUTPUT
FINE TUNING

NOTES:
1. UNLESS OTHERWISE SPECIFIED:
   A. RESISTANCE IS MEASURED IN OHMS, ±5%, 1/4W
   B. CAPACITANCE IS MEASURED IN pf.
2. HEAVY LINE DENOTES MAIN SIGNAL PATH.
3. NOMINAL VALUE. FINAL VALUE FACTORY SELECTED FROM THE FOLLOWING; 2.0, 24 OR 2.7pF NPO.

Figure 6-1. Type 7165 30-60 MC Tuner, Schematic Diagram

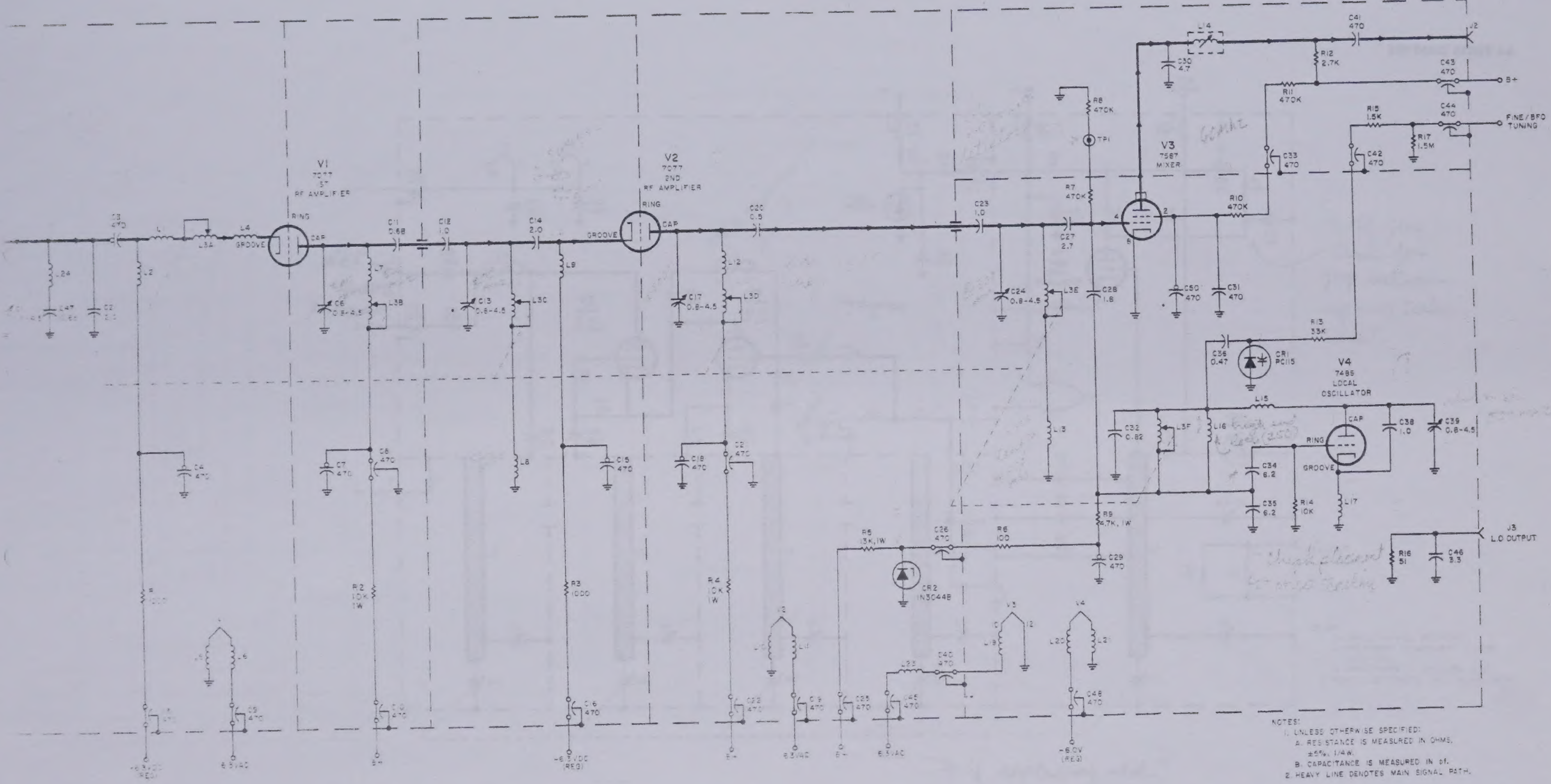
REF DESIG PREFIX A2


V2
8058
SHELL
2,4,8
V1
8058
SHELL
2,4,8
V3
7587
V4
6CW4
RF INPUT
J1
J2
IF OUTPUT
J4
LO OUTPUT
B-
B+
DELAYED AGC
FINE TUNING
6.3 VAC
6.3 VAC
C34 1000
R5 6.2K 2W
C6 1000
L4
L3
L5
C7 510
R6 10
C8 1000
C2 8.2
R1 100K
C1 5.6
L1A
C3 1.0
L2
C4 6.2
C5 0.5-4.5
R3 680K
C35 1000
C11 0.7-9.0
L6
R7 15K
L1B
C12 47
C13 47
C14 1.0
C15 0.7-9.0
C4 (SEE NOTE 2)
C23 (SEE NOTE 3)
R18 22K
L7
C16 1.0
C17 0.22
L8
L1
C18 0.7-9.0
C19 5.1
R9 470K
TP1
R10 470K
C20 1.0
C22 1.5
C42 4.7
R19 51
L12
R11 330K
C21 1000
C40 1000
R12 33K
C39 1000
C44 2.4
R13 10K 1/2W
CR1 V27E
R8 6.8K 2W
L10
L1D
C9 0.47
L9
C25 1.2
C26 (NOTE 3)
C27 3.3
R15 47K
R16 4.7K
C29 0.7-9.0
R17 4.7K
B+
R2 13K 1W
C38 1000
CR2 1N3044B
R20 100K
C43 1000
C24 1000
V1 10 12
V2 10 12
FB1
C30 1000
C31 1000
C36 1000
V3 10 12
V4 10 12
C32 1000
C33 1000
L13
C37 1000

NOTES:
1. UNLESS OTHERWISE SPECIFIED:
   A. RESISTANCE IS MEASURED IN OHMS ±5%, 1/4W.
   B. CAPACITANCE IS MEASURED IN pf
2. PART OF CIRCUIT BOARD, CERAMIC
3. NOMINAL VALUE 2.7pf; FINAL VALUE FACTORY SELECTED.
4. HEAVY LINE DENOTES MAIN SIGNAL PATH.

Figure 6-2. Type 7164 60-300 MC Tuner, Schematic Diagram

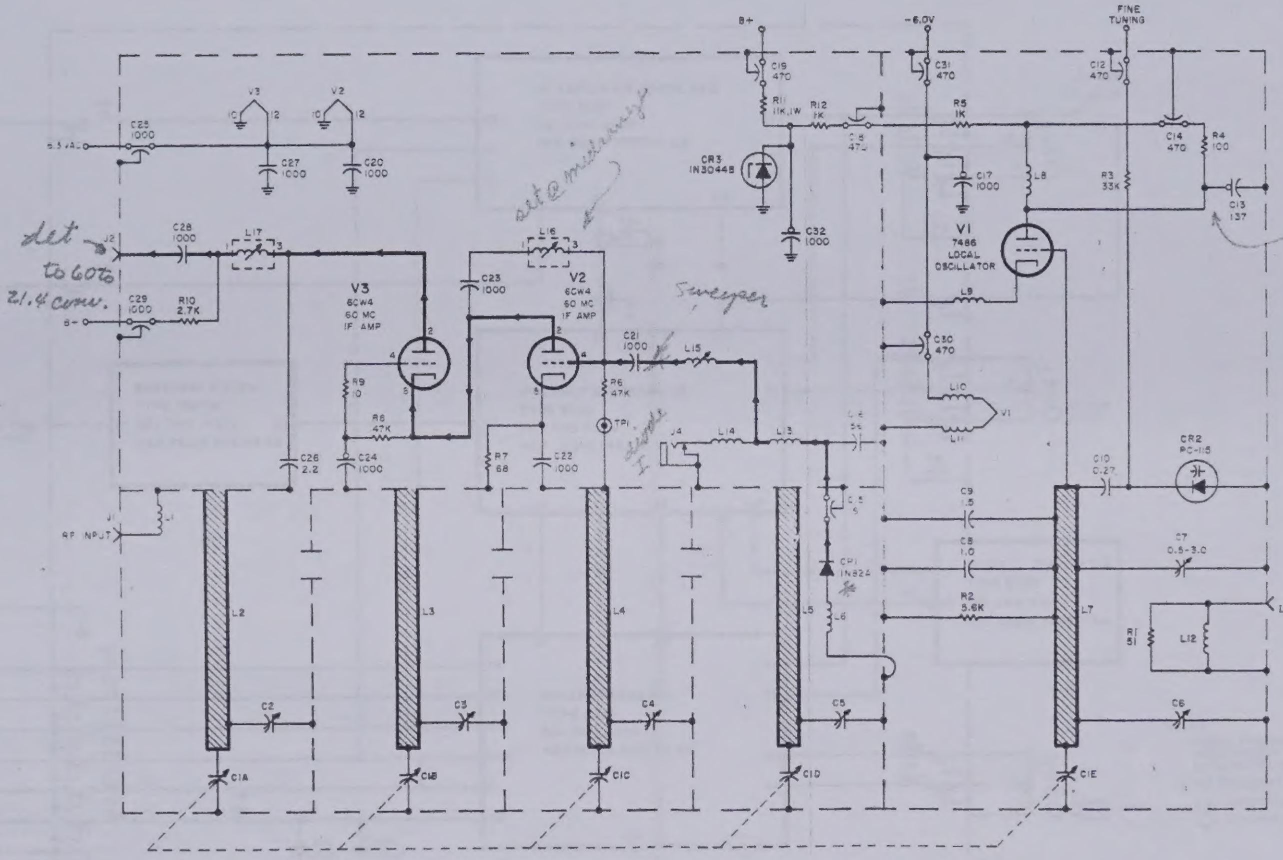
REF DESIG PREFIX A3


V1
7077
1ST
RF AMPLIFIER
V2
7077
2ND
RF AMPLIFIER
V3
7587
MIXER
V4
7486
LOCAL
OSCILLATOR
RING
CAP
GROOVE
C3 470
L1
L3A
L4
L24
C47
C2
L2
C6 0.8-4.5
L7
L3B
C11 0.68
C12 1.0
C13 0.8-4.5
L3C
C14 2.0
L9
L8
C17 0.8-4.5
L12
L3D
C20 0.5
C23 1.0
C24 0.8-4.5
L3E
L13
C27 2.7
C28 1.8
R7 470K
R8 470K
TP1
C50 470
C31 470
R10 470K
C30 4.7
L14
R12 2.7K
C41 470
J2
R11 470K
C43 470
B+
C33 470
R15 1.5K
R17 1.5M
C44 470
FINE/BFO TUNING
C42 470
R13 33K
C36 0.47
CR1 PC115
L15
C32 0.82
L3F
L16
C34 6.2
C35 6.2
R14 10K
L17
C38 1.0
C39 0.8-4.5
R16 51
C46 3.3
J3
L.O OUTPUT
R9 4.7K, 1W
C29 470
R6 100
C26 470
R5 13K, 1W
CR2 1N3044B
C4 470
C7 470
C8 470
C15 470
C18 470
C21 470
R1 1000
R2 10K 1W
R3 1000
R4 10K 1W
C1 470
C5 470
C10 470
C16 470
C22 470
C19 470
C25 470
C45 470
C40 470
C48 470
L5
L6
L10
L11
L18
L19
L20
L21
L22
V1
V2
V3
V4
-6.3VDC (REG)
6.3VAC
B+
-6.0V (REG)

NOTES:
1. UNLESS OTHERWISE SPECIFIED:
A. RESISTANCE IS MEASURED IN OHMS, ±5%, 1/4 W.
B. CAPACITANCE IS MEASURED IN pf.
2. HEAVY LINE DENOTES MAIN SIGNAL PATH.

Figure 6-3. Type 7162 235-500 MC Tuner, Schematic Diagram

REF DESIG PREFIX A4


det to 60 to 21.4 conv.
J2
6.3 VAC
B−
C25 1000
C27 1000
C20 1000
C28 1000
C29 1000
R10 2.7K
L17
V3 6CW4 60 MC IF AMP
V2 6CW4 60 MC IF AMP
R9 10
R8 47K
C26 2.2
C24 1000
C23 1000
L16
set @ midrange
R7 68
C22 1000
R6 47K
TP1
C21 1000
L15
Sweeper
diode I
J4
L14
L13
B+
C19 470
R11 11K,1W
R12 1K
C18 47U
CR3 1N3044B
C32 1000
−6.0V
C31 470
R5 1K
C17 1000
V1 7486 LOCAL OSCILLATOR
L8
L9
C30 470
L10
L11
C16 56
C15 5
CP1 1N82A *
L6
FINE TUNING
C12 470
C14 470
R4 100
R3 33K
C13 137
C10 0.27
CR2 PC-115
C9 1.5
C8 1.0
C7 0.5-3.0
R2 5.6K
J3 L.O. OUTPUT
R1 51
L12
J1 RF INPUT
L1
L2
L3
L4
L5
L7
C2
C3
C4
C5
C6
C1A
C1B
C1C
C1D
C1E

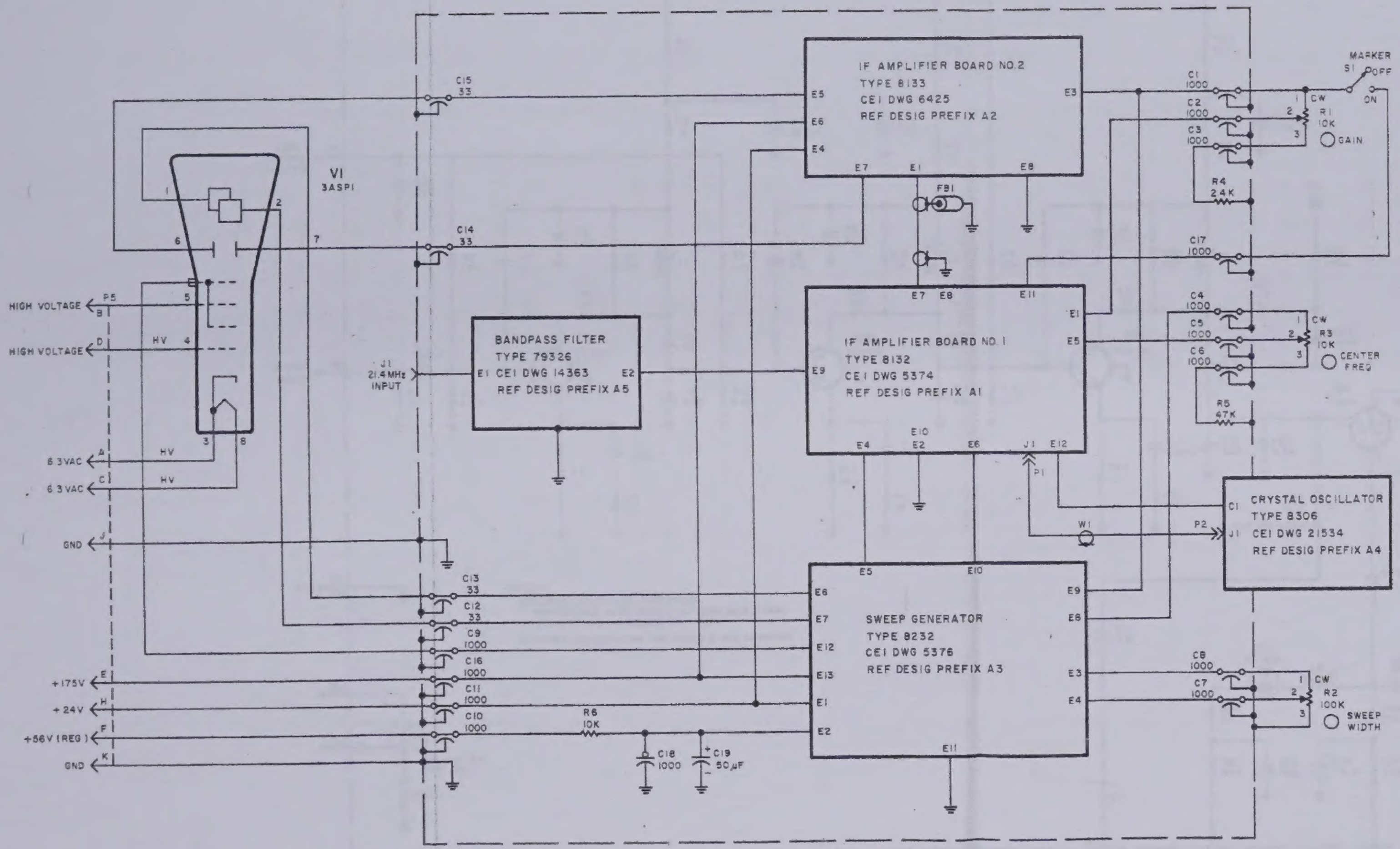
(if off freq) Check for gap between Cap and tube socket.

NOTES:
1. UNLESS OTHERWISE SPECIFIED:
   A. RESISTANCE IS MEASURED IN OHMS, ±5%, 1/4W.
   B. CAPACITANCE IS MEASURED IN pf.
2. HEAVY LINE DENOTES MAIN SIGNAL PATH.

* if replacing old style IN82 with new solder a .27pf across new diode.

Figure 6-4. Type 7163 490-1000 MC Tuner, Schematic Diagram

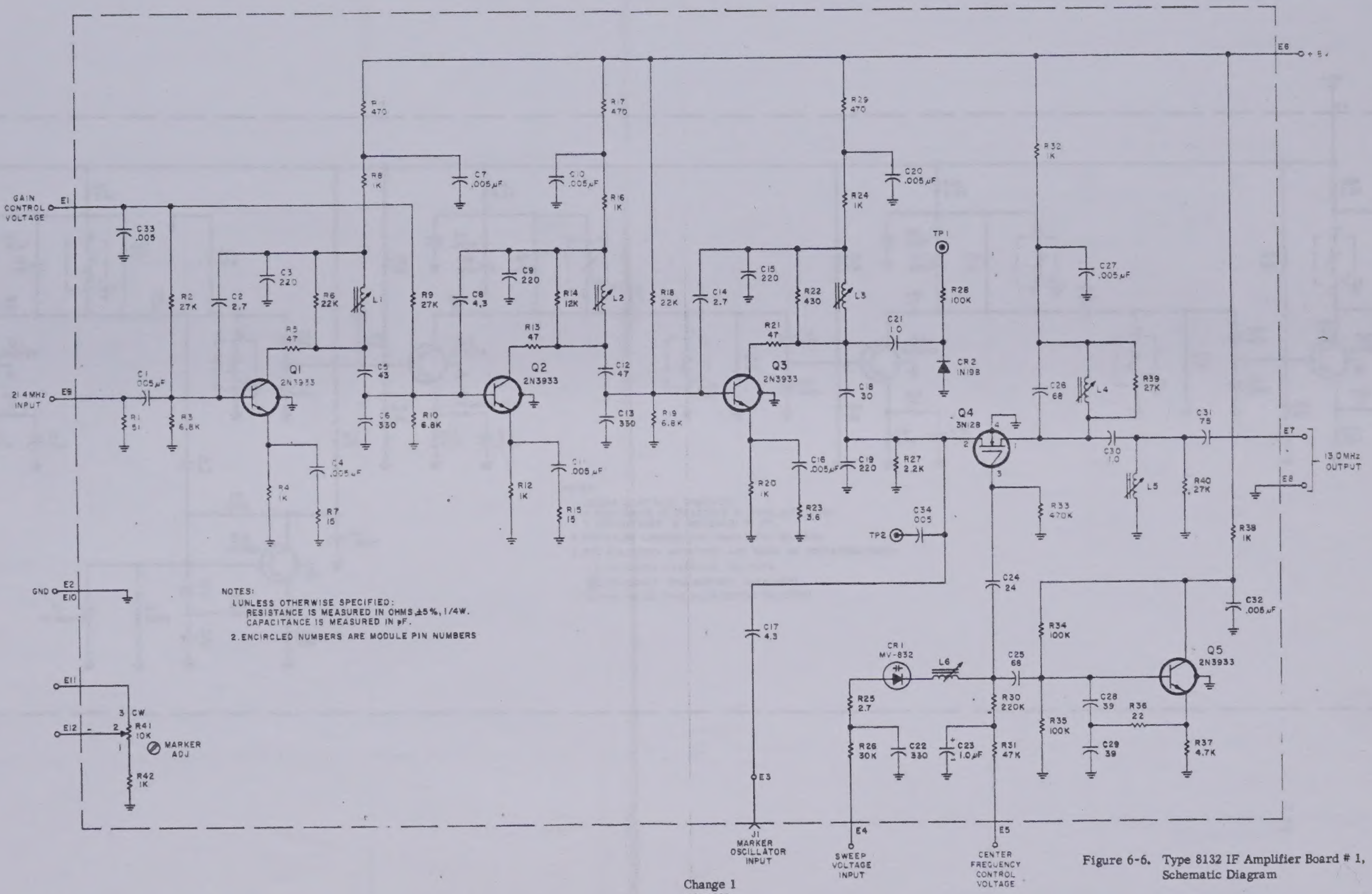
REF DESIG PREFIX A5


IF AMPLIFIER BOARD NO.2
TYPE 8133
CEI DWG 6425
REF DESIG PREFIX A2
E5
E6
E4
E7
E1
E8
E3
FB1
V1
3ASP1
1
2
6
7
5
4
3
8
C15
33
C14
33
HIGH VOLTAGE
P5
B
HIGH VOLTAGE
D
HV
6.3VAC
A
HV
6.3VAC
C
HV
GND
J
+175V
E
+24V
H
+56V (REG)
F
GND
K
J1
21.4MHz
INPUT
BANDPASS FILTER
TYPE 79326
CEI DWG 14363
REF DESIG PREFIX A5
E1
E2
IF AMPLIFIER BOARD NO.1
TYPE 8132
CEI DWG 5374
REF DESIG PREFIX A1
E7
E8
E11
E1
E5
E9
E10
E4
E2
E6
J1
E12
P1
W1
P2
CRYSTAL OSCILLATOR
TYPE 8306
CEI DWG 21534
REF DESIG PREFIX A4
C1
J1
SWEEP GENERATOR
TYPE 8232
CEI DWG 5376
REF DESIG PREFIX A3
E5
E10
E6
E7
E12
E13
E1
E2
E9
E8
E3
E4
E11
C13
33
C12
33
C9
1000
C16
1000
C11
1000
C10
1000
R6
10K
C18
1000
C19
50µF
C1
1000
C2
1000
C3
1000
R4
2.4K
C17
1000
C4
1000
C5
1000
C6
1000
R5
47K
C8
1000
C7
1000
MARKER
S1
OFF
ON
CW
R1
10K
GAIN
CW
R3
10K
CENTER
FREQ
CW
R2
100K
SWEEP
WIDTH

NOTES:
1. UNLESS OTHERWISE SPECIFIED
RESISTANCE IS MEASURED IN OHMS, ±5%, 1/4W.
CAPACITANCE IS MEASURED IN pF.
2. THE FOLLOWING NOTATIONS ARE USED ON POTENTIOMETERS:
CW INDICATES CLOCKWISE ROTATION OF CONTROL KNOB.
○ INDICATES FRONT PANEL CONTROL.

Figure 6-5. Type 79358 Signal Monitor, Schematic Diagram

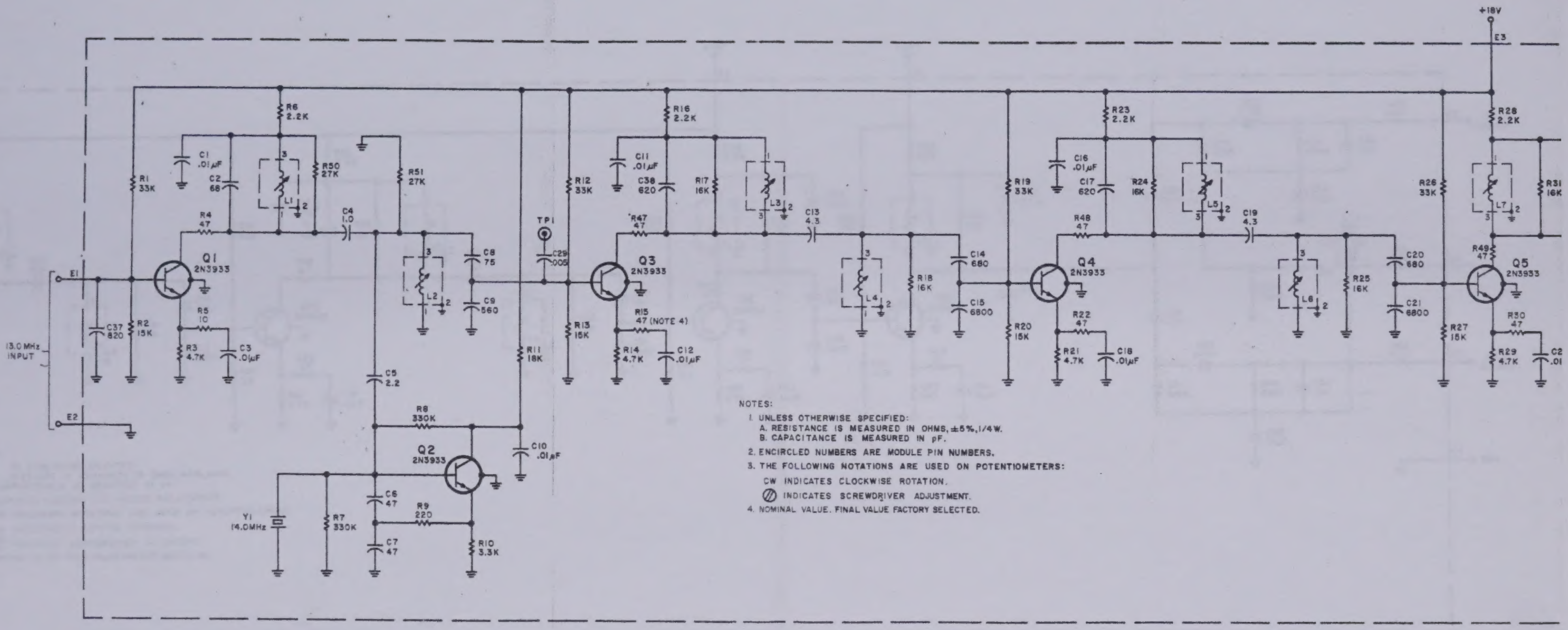
REF DESIG PREFIX A5A1


GAIN CONTROL VOLTAGE
E1
21.4MHz INPUT
E9
GND
E2
E10
E11
E12
E3
J1 MARKER OSCILLATOR INPUT
E4 SWEEP VOLTAGE INPUT
E5 CENTER FREQUENCY CONTROL VOLTAGE
E6 +5V
E7
E8
13.0MHz OUTPUT
Q1 2N3933
Q2 2N3933
Q3 2N3933
Q4 3N128
Q5 2N3933
CR1 MV-832
CR2 IN198
TP1
TP2
L1
L2
L3
L4
L5
L6
C1 .005µF
C2 2.7
C3 220
C4 .005µF
C5 43
C6 330
C7 .005µF
C8 4.3
C9 220
C10 .005µF
C11 .005µF
C12 47
C13 330
C14 2.7
C15 220
C16 .005µF
C17 4.3
C18 30
C19 220
C20 .005µF
C21 1.0
C22 330
C23 1.0µF
C24 24
C25 68
C26 68
C27 .005µF
C28 39
C29 39
C30 1.0
C31 75
C32 .005µF
C33 .005
C34 .005
R1 51
R2 27K
R3 6.8K
R4 1K
R5 47
R6 22K
R7 15
R8 1K
R9 27K
R10 6.8K
R11 470
R12 1K
R13 47
R14 12K
R15 15
R16 1K
R17 470
R18 22K
R19 6.8K
R20 1K
R21 47
R22 430
R23 3.6
R24 1K
R25 2.7
R26 30K
R27 2.2K
R28 100K
R29 470
R30 220K
R31 47K
R32 1K
R33 470K
R34 100K
R35 100K
R36 22
R37 4.7K
R38 1K
R39 27K
R40 27K
R41 10K
R42 1K
3 CW
MARKER ADJ

NOTES:

1. UNLESS OTHERWISE SPECIFIED:
   RESISTANCE IS MEASURED IN OHMS ±5%, 1/4W.
   CAPACITANCE IS MEASURED IN pF.
2. ENCIRCLED NUMBERS ARE MODULE PIN NUMBERS

Figure 6-6. Type 8132 IF Amplifier Board # 1, Schematic Diagram


13.0 MHz INPUT
E1
E2
E3
+18V
C37 820
R1 33K
R2 15K
Q1 2N3933
R4 47
R5 10
R3 4.7K
C3 .01µF
C1 .01µF
C2 68
R6 2.2K
L1
R50 27K
C4 1.0
R51 27K
L2
C8 75
C9 560
C5 2.2
R8 330K
Q2 2N3933
Y1 14.0MHz
R7 330K
C6 47
C7 47
R9 220
R10 3.3K
R11 18K
C10 .01µF
TP1
C29 .005
R12 33K
R13 15K
Q3 2N3933
R47 47
R15 47 (NOTE 4)
R14 4.7K
C12 .01µF
R16 2.2K
C11 .01µF
C38 620
R17 16K
L3
C13 4.3
L4
R18 16K
C14 680
C15 6800
R19 33K
R20 15K
Q4 2N3933
R48 47
R22 47
R21 4.7K
C18 .01µF
R23 2.2K
C16 .01µF
C17 620
R24 16K
L5
C19 4.3
L6
R25 16K
C20 680
C21 6800
R26 33K
R27 15K
Q5 2N3933
R49 47
R30 47
R29 4.7K
C2 .01
R28 2.2K
L7
R31 16K

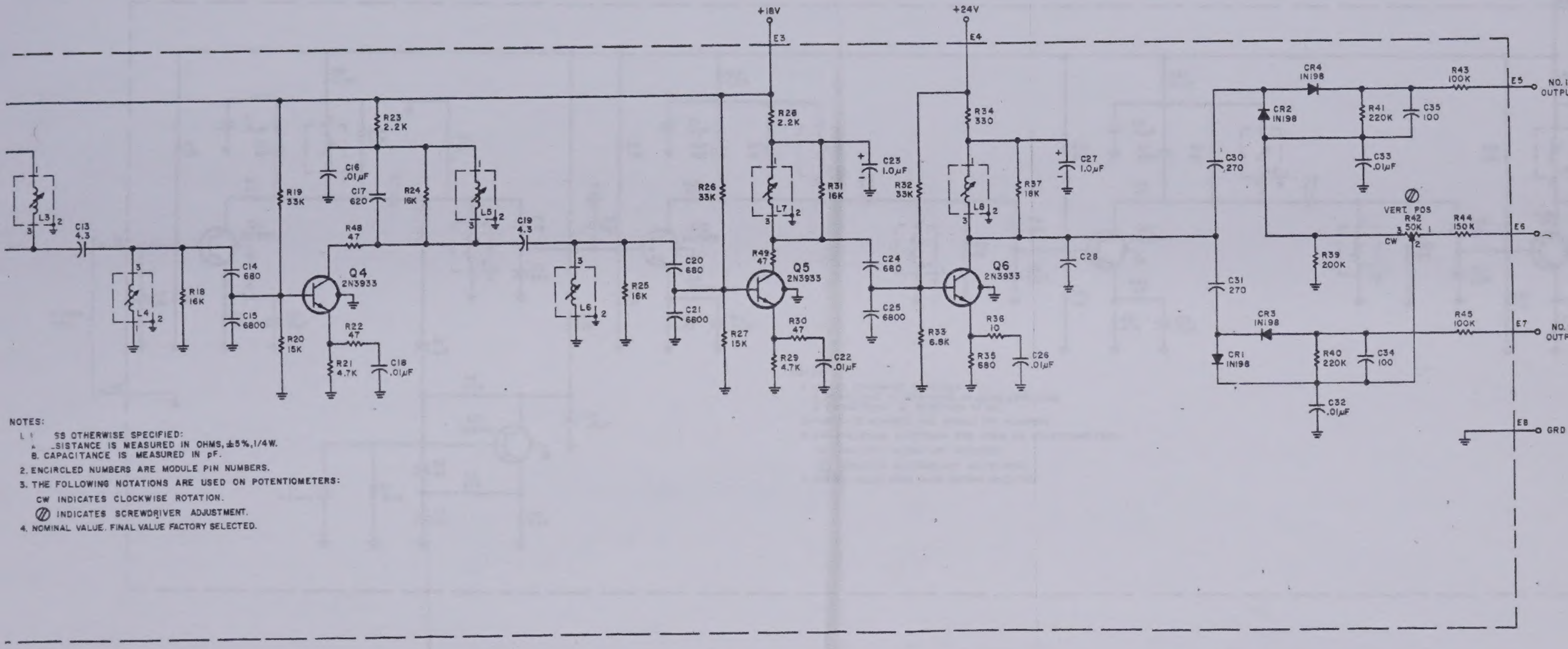
NOTES:

1. UNLESS OTHERWISE SPECIFIED:
   A. RESISTANCE IS MEASURED IN OHMS, ±5%, 1/4W.
   B. CAPACITANCE IS MEASURED IN pF.
2. ENCIRCLED NUMBERS ARE MODULE PIN NUMBERS.
3. THE FOLLOWING NOTATIONS ARE USED ON POTENTIOMETERS:

   CW INDICATES CLOCKWISE ROTATION.

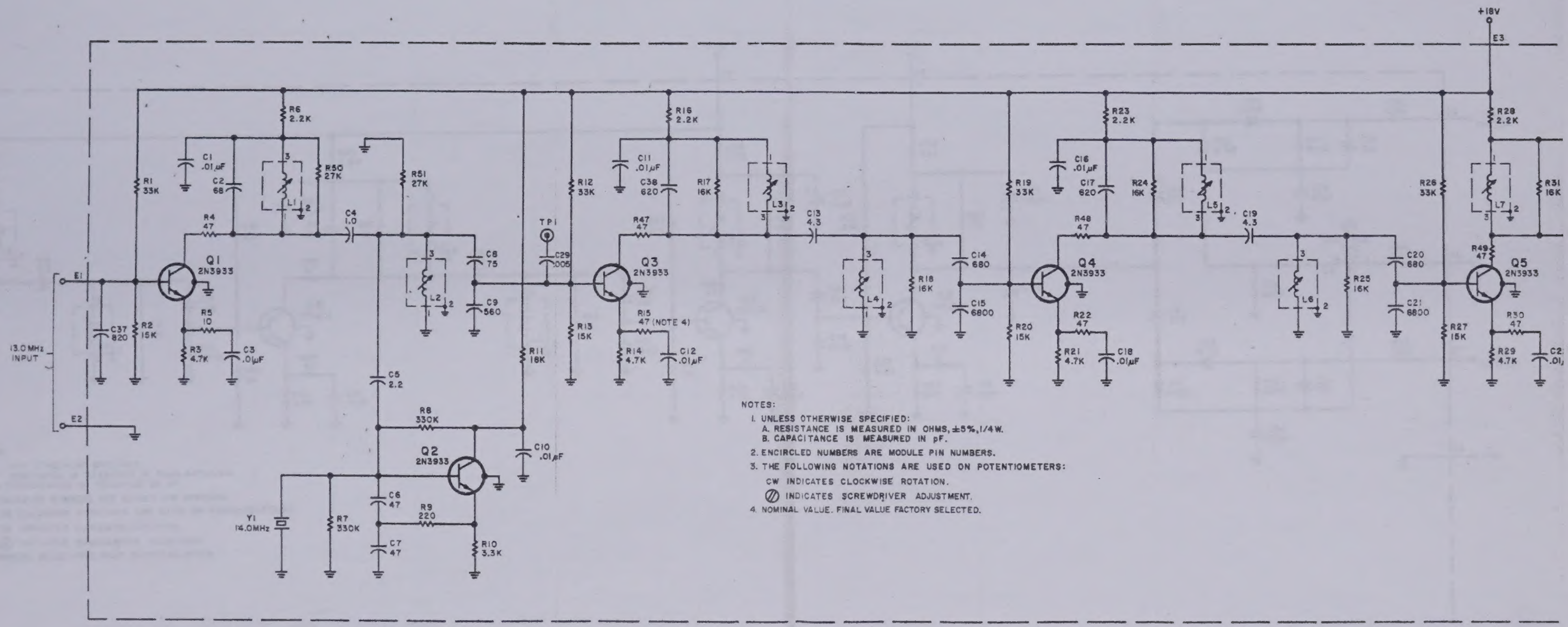
   ⊘ INDICATES SCREWDRIVER ADJUSTMENT.
4. NOMINAL VALUE. FINAL VALUE FACTORY SELECTED.

REF DESIG PREFIX A5A2


+18V
+24V
E3
E4
E5
E6
E7
E8
NO. 1 OUTPUT
NO. 2 OUTPUT
GRD
L3
C13 4.3
L4
R18 16K
C14 680
C15 6800
R19 33K
R20 15K
Q4 2N3933
R21 4.7K
R22 47
C18 .01μF
R48 47
C16 .01μF
C17 620
R23 2.2K
R24 16K
L5
C19 4.3
L6
R25 16K
C20 680
C21 6800
R26 33K
R27 15K
Q5 2N3933
R49 47
R28 2.2K
L7
R31 16K
C23 1.0μF
R30 47
R29 4.7K
C22 .01μF
C24 680
C25 6800
R32 33K
R33 6.8K
Q6 2N3933
R34 330
L8
R37 18K
C27 1.0μF
C28
R36 10
R35 680
C26 .01μF
C30 270
C31 270
CR4 IN198
CR2 IN198
CR3 IN198
CR1 IN198
R41 220K
C35 100
C33 .01μF
R43 100K
VERT. POS
R42 50K
CW
R39 200K
R44 150K
R40 220K
C34 100
C32 .01μF
R45 100K

NOTES:
1. UNLESS OTHERWISE SPECIFIED:
A. RESISTANCE IS MEASURED IN OHMS, ±5%, 1/4W.
B. CAPACITANCE IS MEASURED IN pF.
2. ENCIRCLED NUMBERS ARE MODULE PIN NUMBERS.
3. THE FOLLOWING NOTATIONS ARE USED ON POTENTIOMETERS:
CW INDICATES CLOCKWISE ROTATION.
⊘ INDICATES SCREWDRIVER ADJUSTMENT.
4. NOMINAL VALUE. FINAL VALUE FACTORY SELECTED.

Figure 6-7. Type 8133 IF Amplifier Board #2, Schematic Diagram


+18V
E3
13.0MHz INPUT
E1
E2
C37 820
R1 33K
R2 15K
Q1 2N3933
R3 4.7K
R4 47
R5 10
C3 .01μF
C1 .01μF
C2 68
R6 2.2K
L1
R50 27K
C4 1.0
R51 27K
L2
C8 75
C9 560
C5 2.2
R8 330K
Q2 2N3933
R7 330K
Y1 14.0MHz
C6 47
C7 47
R9 220
R10 3.3K
C10 .01μF
R11 18K
TP1
C29 .005
R12 33K
R13 15K
Q3 2N3933
R15 47 (NOTE 4)
R14 4.7K
C12 .01μF
R47 47
R16 2.2K
C11 .01μF
C38 620
R17 16K
L3
C13 4.3
L4
R18 16K
C14 680
C15 6800
R19 33K
R20 15K
Q4 2N3933
R48 47
R22 47
R21 4.7K
C18 .01μF
R23 2.2K
C16 .01μF
C17 620
R24 16K
L5
C19 4.3
L6
R25 16K
C20 680
C21 6800
R26 33K
R27 15K
Q5 2N3933
R49 47
R30 47
R29 4.7K
C2 .01
R28 2.2K
L7
R31 16K

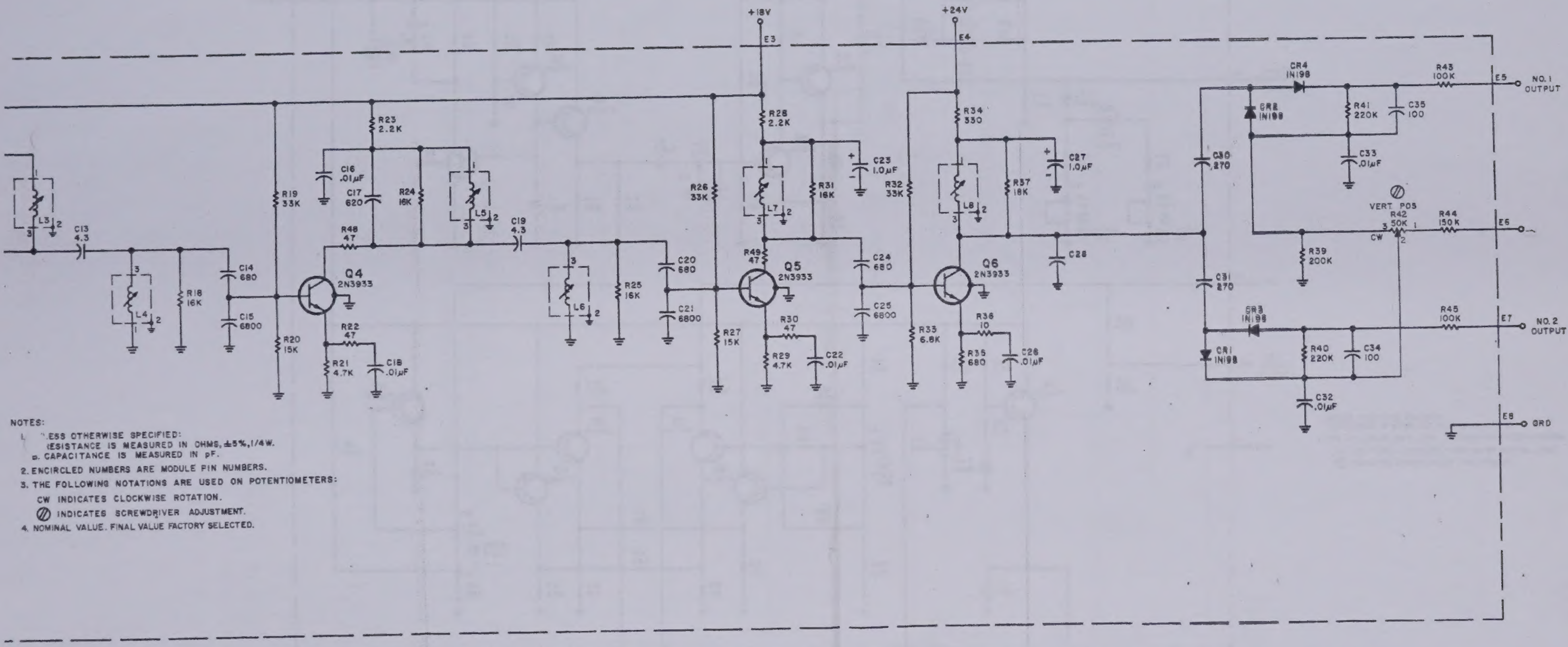
NOTES:

1. UNLESS OTHERWISE SPECIFIED:
   A. RESISTANCE IS MEASURED IN OHMS, ±5%, 1/4 W.
   B. CAPACITANCE IS MEASURED IN pF.
2. ENCIRCLED NUMBERS ARE MODULE PIN NUMBERS.
3. THE FOLLOWING NOTATIONS ARE USED ON POTENTIOMETERS:

   CW INDICATES CLOCKWISE ROTATION.

   ⊘ INDICATES SCREWDRIVER ADJUSTMENT.
4. NOMINAL VALUE. FINAL VALUE FACTORY SELECTED.

REF DESIG PREFIX A5A2

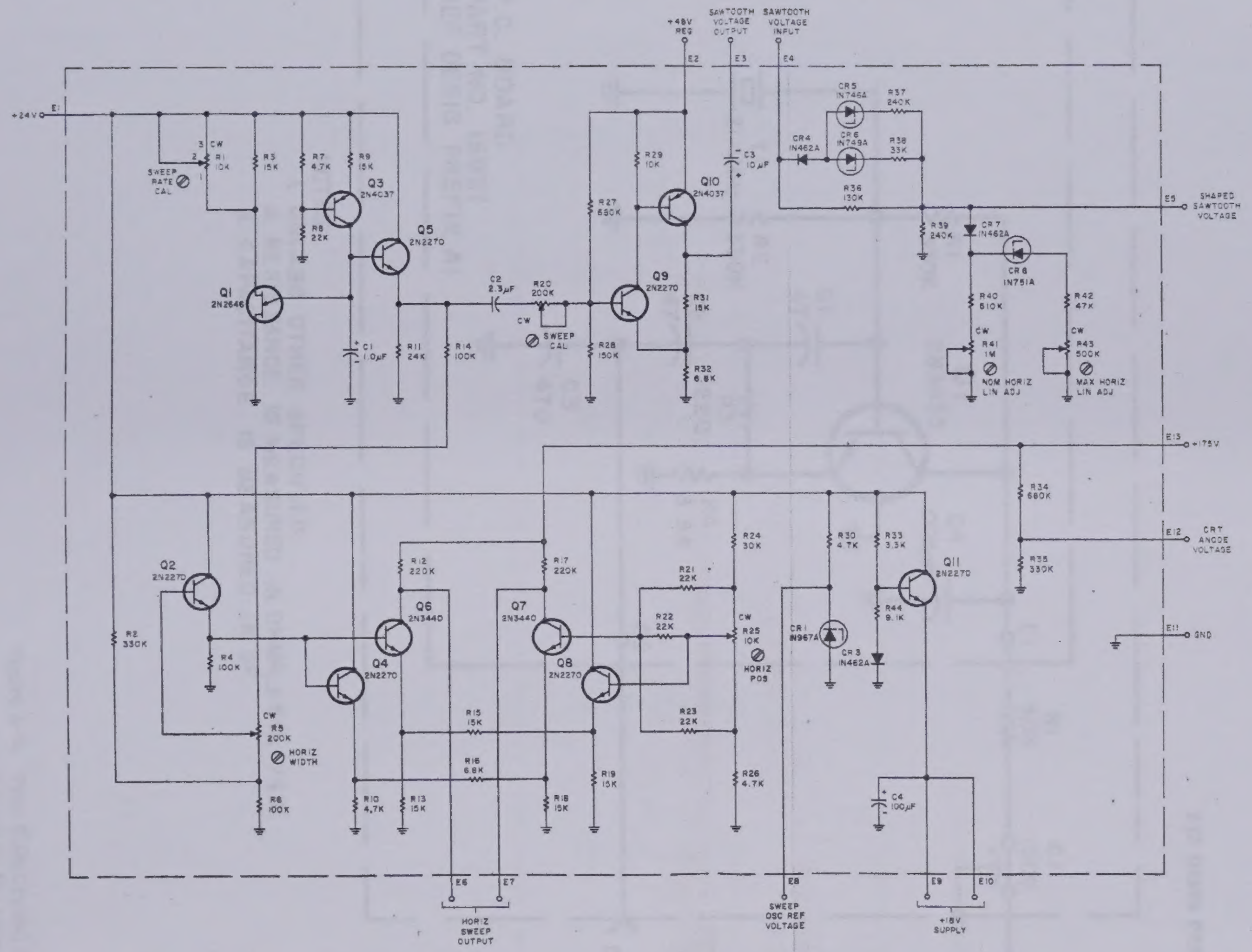

+18V
E3
+24V
E4
L3
C13
4.3
L4
R18
16K
C14
680
C15
6800
R19
33K
R20
15K
Q4
2N3933
R48
47
R22
47
R21
4.7K
C18
.01µF
R23
2.2K
C16
.01µF
C17
620
R24
16K
L5
C19
4.3
L6
R25
16K
C20
680
C21
6800
R26
33K
R27
15K
R28
2.2K
L7
R31
16K
C23
1.0µF
R49
47
Q5
2N3933
R30
47
R29
4.7K
C22
.01µF
C24
680
C25
6800
R32
33K
R33
6.8K
R34
330
L8
R37
18K
C27
1.0µF
Q6
2N3933
R36
10
R35
680
C26
.01µF
C28
C30
270
C31
270
CR4
IN198
CR2
IN198
R41
220K
C35
100
C33
.01µF
R43
100K
E5
NO. 1
OUTPUT
VERT POS
R42
50K
CW
R39
200K
R44
150K
E6
CR3
IN198
CR1
IN198
R40
220K
C34
100
C32
.01µF
R45
100K
E7
NO. 2
OUTPUT
E8
GRD

NOTES:

1. UNLESS OTHERWISE SPECIFIED:
   a. RESISTANCE IS MEASURED IN OHMS, ±5%, 1/4W.
   b. CAPACITANCE IS MEASURED IN pF.
2. ENCIRCLED NUMBERS ARE MODULE PIN NUMBERS.
3. THE FOLLOWING NOTATIONS ARE USED ON POTENTIOMETERS:
   CW INDICATES CLOCKWISE ROTATION.
   ⊘ INDICATES SCREWDRIVER ADJUSTMENT.
4. NOMINAL VALUE. FINAL VALUE FACTORY SELECTED.

Figure 6-7. Type 8133 IF Amplifier Board #2, Schematic Diagram

R EF DESIG PREFIX A5A3

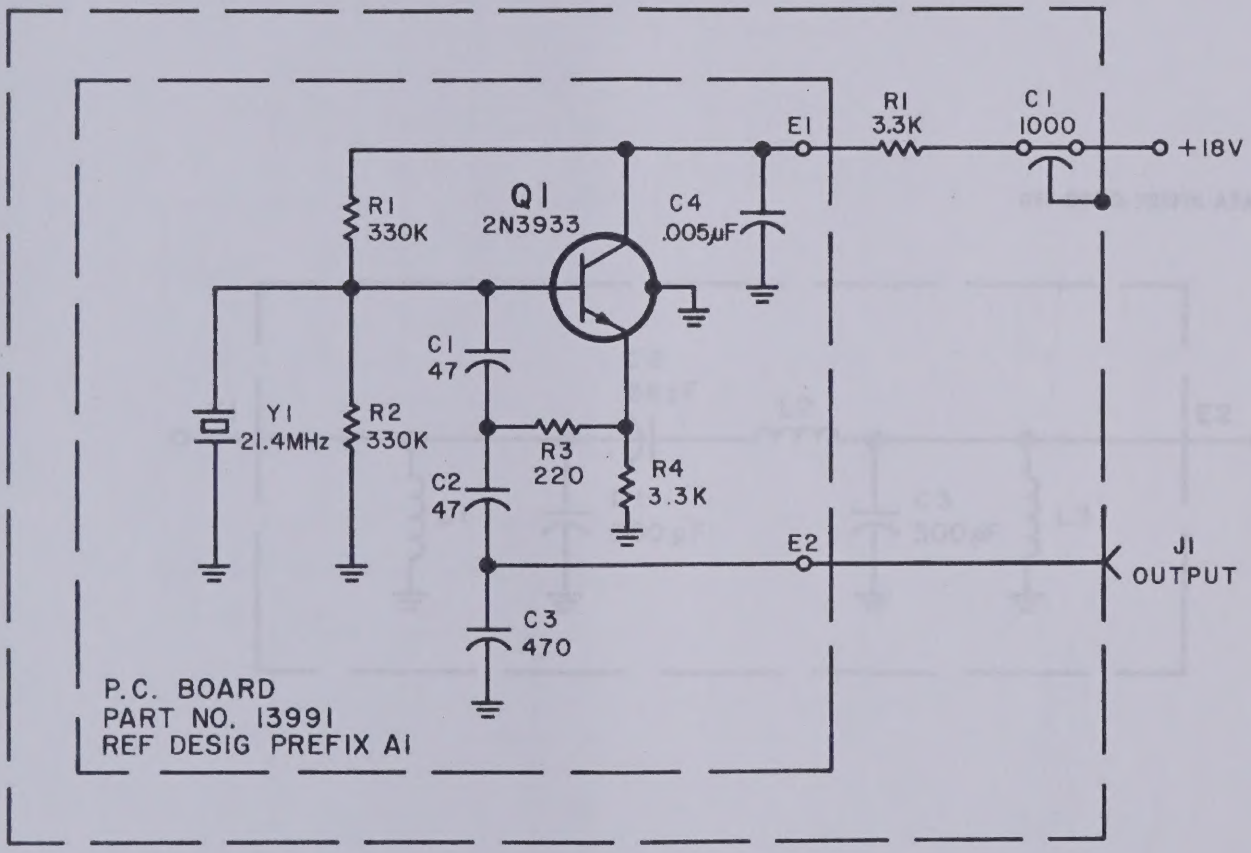

+24V
E1
SWEEP RATE CAL
R1 10K
CW
R3 15K
R7 4.7K
R9 15K
Q3 2N4037
R8 22K
Q5 2N2270
Q1 2N2646
C1 1.0µF
R11 24K
R14 100K
C2 2.3µF
R20 200K
SWEEP CAL
+48V REG
E2
SAWTOOTH VOLTAGE OUTPUT
E3
SAWTOOTH VOLTAGE INPUT
E4
R27 680K
R29 10K
Q10 2N4037
C3 10µF
Q9 2N2270
R28 150K
R31 15K
R32 6.8K
CR4 IN462A
CR5 IN746A
CR6 IN749A
R37 240K
R38 33K
R36 130K
R39 240K
CR7 IN462A
CR8 IN751A
R40 510K
R41 1M
NOM HORIZ LIN ADJ
R42 47K
R43 500K
MAX HORIZ LIN ADJ
E5
SHAPED SAWTOOTH VOLTAGE
E13
+175V
R34 680K
E12
CRT ANODE VOLTAGE
R35 330K
E11
GND
Q2 2N2270
R2 330K
R4 100K
R5 200K
HORIZ WIDTH
R6 100K
R12 220K
Q6 2N3440
Q4 2N2270
R10 4.7K
R13 15K
R15 15K
R16 6.8K
R17 220K
Q7 2N3440
Q8 2N2270
R18 15K
R19 15K
R21 22K
R22 22K
R23 22K
R24 30K
R25 10K
HORIZ POS
R26 4.7K
R30 4.7K
CR1 IN967A
CR3 IN462A
R33 3.3K
R44 9.1K
Q11 2N2270
C4 100µF
E6
E7
HORIZ SWEEP OUTPUT
E8
SWEEP OSC REF VOLTAGE
E9
E10
+18V SUPPLY

NOTES:

1. UNLESS OTHERWISE SPECIFIED:
   RESISTANCE IS MEASURED IN OHMS, ±5%, 1/4 W.
2. THE FOLLOWING NOTATIONS ARE USED ON POTENTIOMETERS.
   CW INDICATES CLOCKWISE ROTATION OF CONTROL KNOB.
   ⊘ INDICATES SCREWDRIVER ADJUSTMENT.

Figure 6-8. Type 8232 Sweep Generator, Schematic Diagram

REF DESIG PREFIX A5A4


RI
3.3K
CI
1000
EI
+18V
QI
2N3933
RI
330K
C4
.005μF
CI
47
YI
21.4MHz
R2
330K
R3
220
R4
3.3K
C2
47
E2
JI
OUTPUT
C3
470
P.C. BOARD
PART NO. 13991
REF DESIG PREFIX AI

NOTES:
1. UNLESS OTHER SPECIFIED:
   A. RESISTANCE IS MEASURED IN OHMS, ± 5%, 1/4 W.
   B. CAPACITANCE IS MEASURED IN pF.

Figure 6-9. Type 8306 Crystal Oscillator, Schematic Diagram

REF DESIG PREFIX A5A5

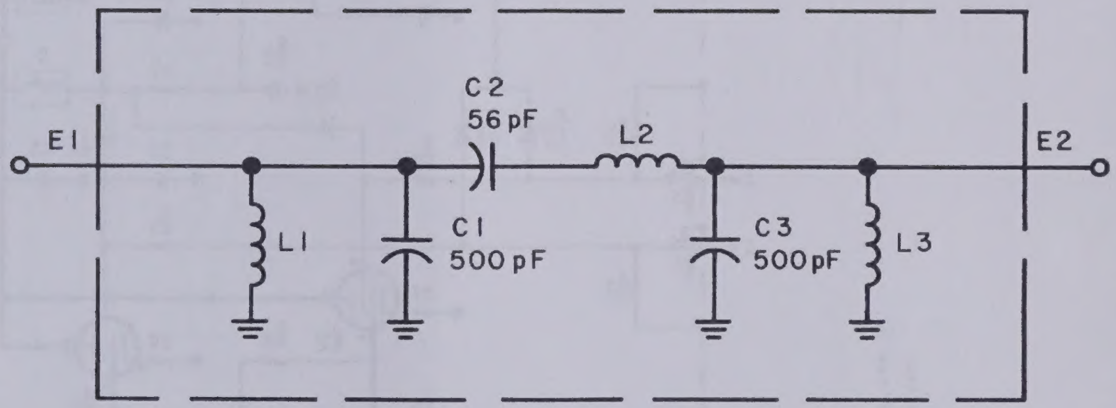
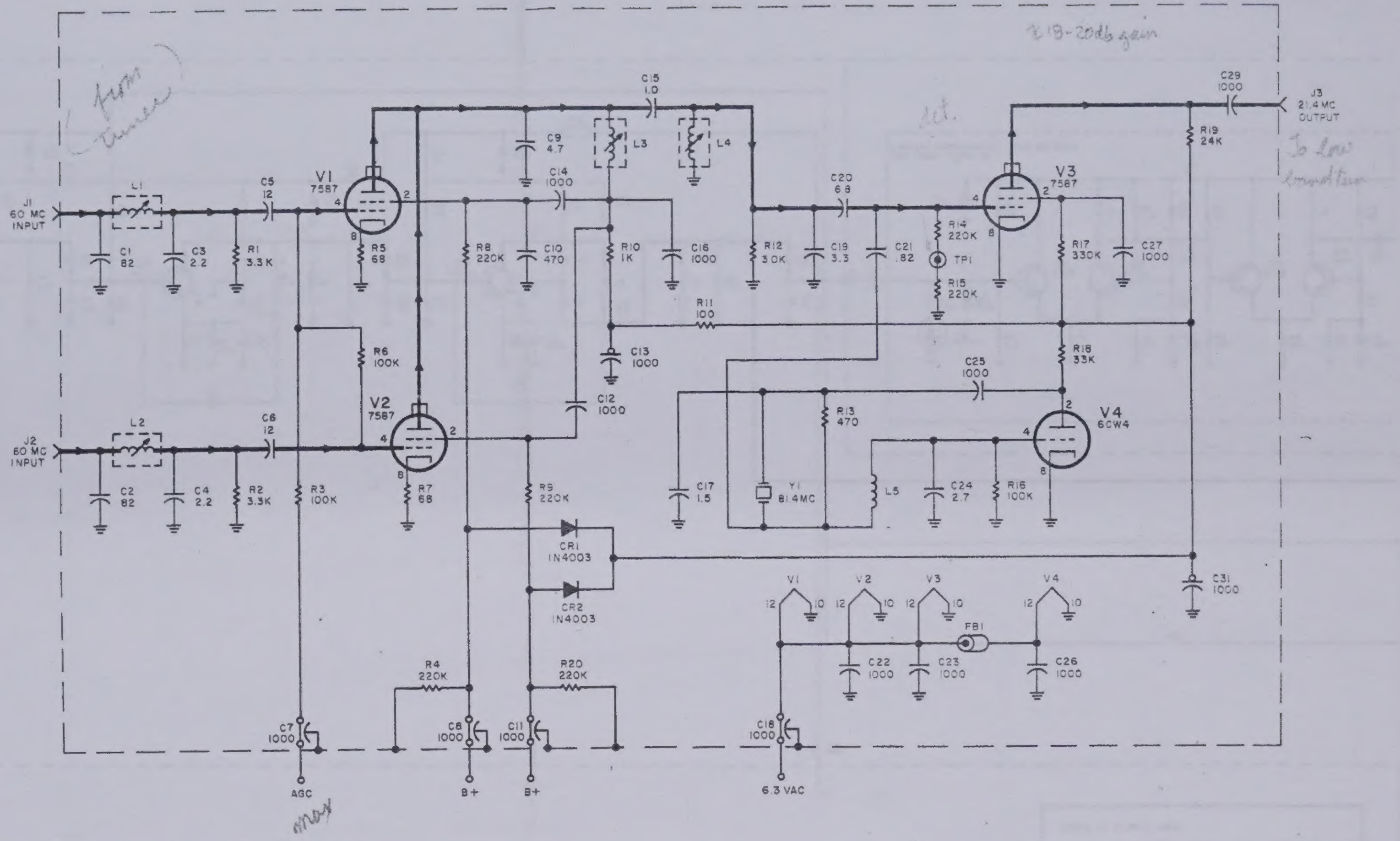

E1
E2
C2
56 pF
L2
L1
C1
500 pF
C3
500pF
L3

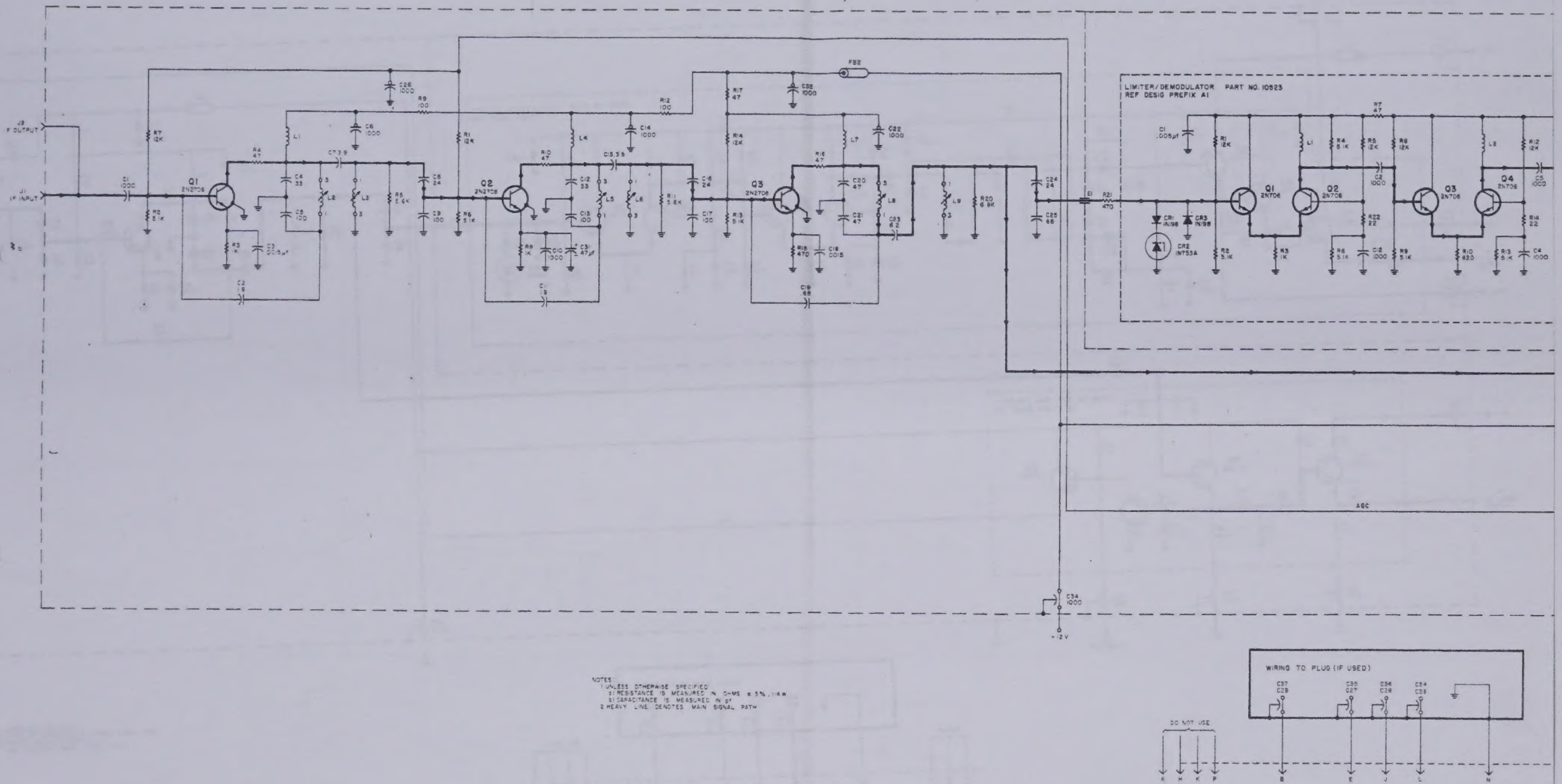
Figure 6-10. Type 79326 Bandpass Filter, Schematic Diagram

REF DESIG PREFIX A6


from tuner
≈18-20db gain
To low band tuner
J1
60 MC
INPUT
J2
60 MC
INPUT
J3
21.4 MC
OUTPUT
L1
L2
L3
L4
L5
C1
82
C2
82
C3
2.2
C4
2.2
C5
12
C6
12
C7
1000
C8
1000
C9
4.7
C10
470
C11
1000
C12
1000
C13
1000
C14
1000
C15
1.0
C16
1000
C17
1.5
C18
1000
C19
3.3
C20
6.8
C21
.82
C22
1000
C23
1000
C24
2.7
C25
1000
C26
1000
C27
1000
C29
1000
C31
1000
R1
3.3K
R2
3.3K
R3
100K
R4
220K
R5
68
R6
100K
R7
68
R8
220K
R9
220K
R10
1K
R11
100
R12
3.0K
R13
470
R14
220K
R15
220K
R16
100K
R17
330K
R18
33K
R19
24K
R20
220K
V1
7587
V2
7587
V3
7587
V4
6CW4
Y1
81.4MC
TP1
CR1
1N4003
CR2
1N4003
FB1
AGC
max
B+
B+
6.3 VAC
12
10

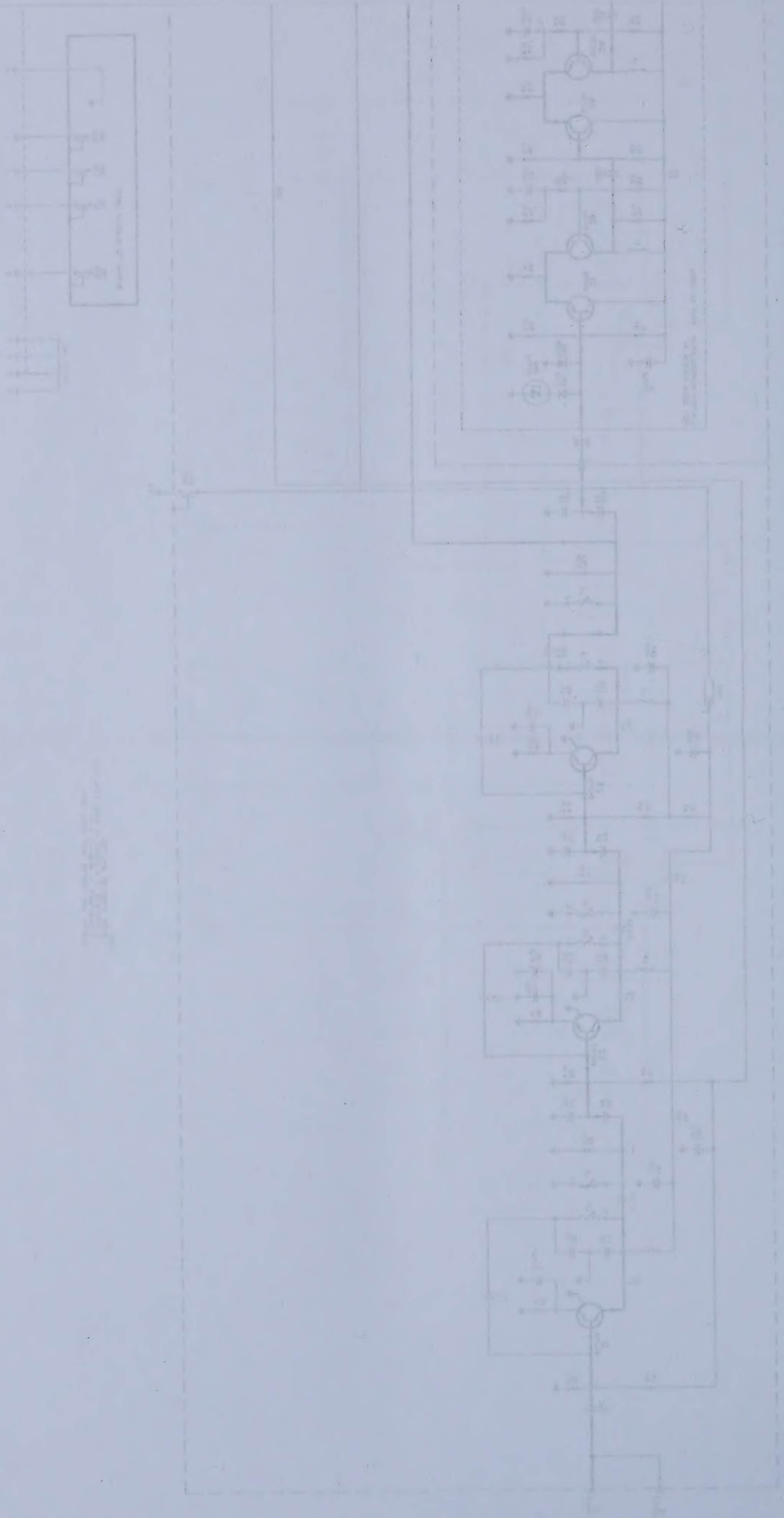
NOTES:
1. UNLESS OTHERWISE SPECIFIED:
   a) RESISTANCE IS MEASURED IN OHMS, ± 5%, 1/4
   b) CAPACITANCE IS MEASURED IN pf.
2. HEAVY LINE DENOTES MAIN SIGNAL PATH.

Figure 6-11. Type 7120 60-21.4 MC Converter, Schematic Diagram

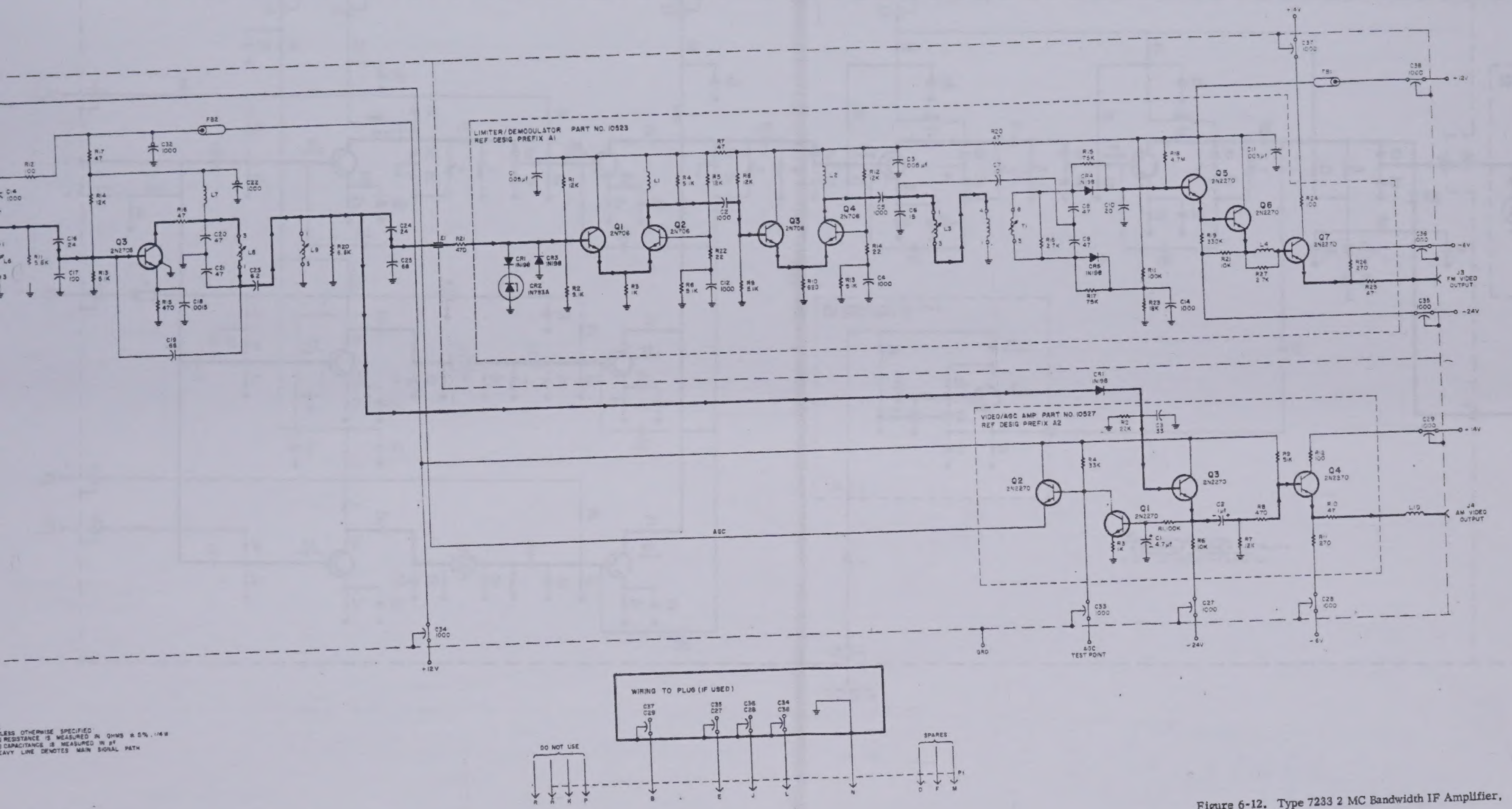

J2
F OUTPUT
J1
IF INPUT
C1
1000
R7
12K
R2
5.1K
Q1
2N2708
R3
1K
C3
.0015μf
C2
1.6
R4
47
L1
C26
1000
R9
100
C6
1000
C4
33
C5
100
L2
C7 3.9
L3
R5
5.6K
C8
24
C9
100
R1
12K
R6
5.1K
Q2
2N2708
R10
47
R8
1K
C10
1000
C31
47μf
C11
1.6
L4
C12
33
C13
100
L5
C14
1000
R12
100
C15 3.9
L6
R11
5.6K
C16
24
C17
100
R17
47
R14
12K
R13
5.1K
C32
1000
FB2
Q3
2N2708
R16
47
R15
470
C18
.0015
C19
.68
L7
C22
1000
C20
47
C21
47
L8
C23
6.2
L9
R20
6.8K
C24
24
C25
68
E1
R21
470
LIMITER/DEMODULATOR PART NO. 10523
REF DESIG PREFIX A1
C1
.005μf
CR1
1N198
CR3
1N198
CR2
1N753A
R1
12K
R2
5.1K
Q1
2N706
Q2
2N706
R3
1K
L1
R4
5.1K
R5
12K
R7
47
R8
12K
C2
1000
R22
22
R6
5.1K
C12
1000
R9
5.1K
Q3
2N706
R10
620
Q4
2N706
L2
R12
12K
C5
1000
R14
22
R13
5.1K
C4
1000
AGC
C34
1000
+12V
WIRING TO PLUG (IF USED)
C37
C29
C35
C27
C36
C28
C34
C35
DO NOT USE
R
H
K
P
B
E
J
L
N

NOTES:
1 UNLESS OTHERWISE SPECIFIED
a) RESISTANCE IS MEASURED IN OHMS ± 5%, 1/4 W
b) CAPACITANCE IS MEASURED IN pf
2 HEAVY LINE DENOTES MAIN SIGNAL PATH

Change 1
7/17/69

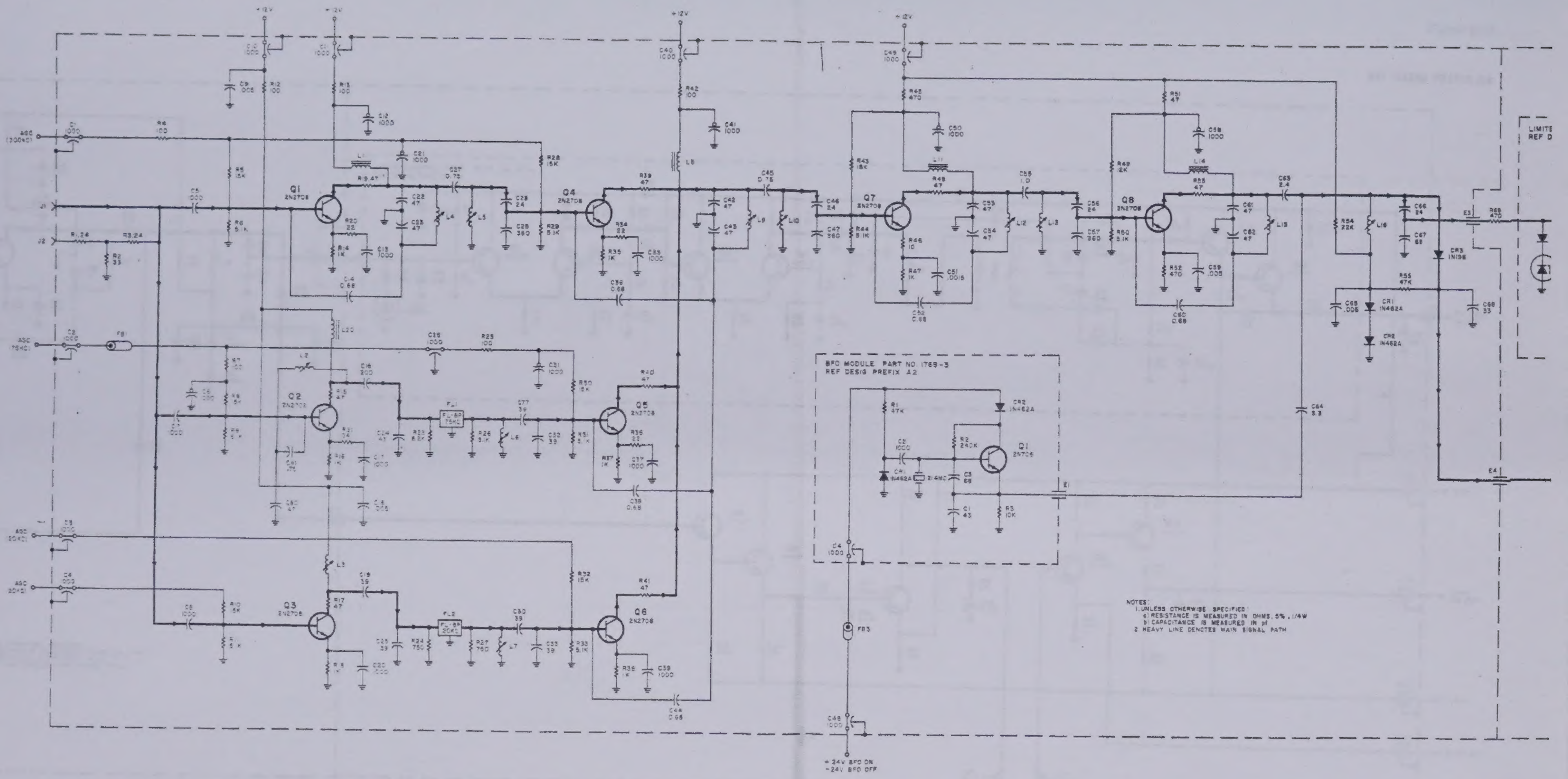


REF DESIG PREFIX A7

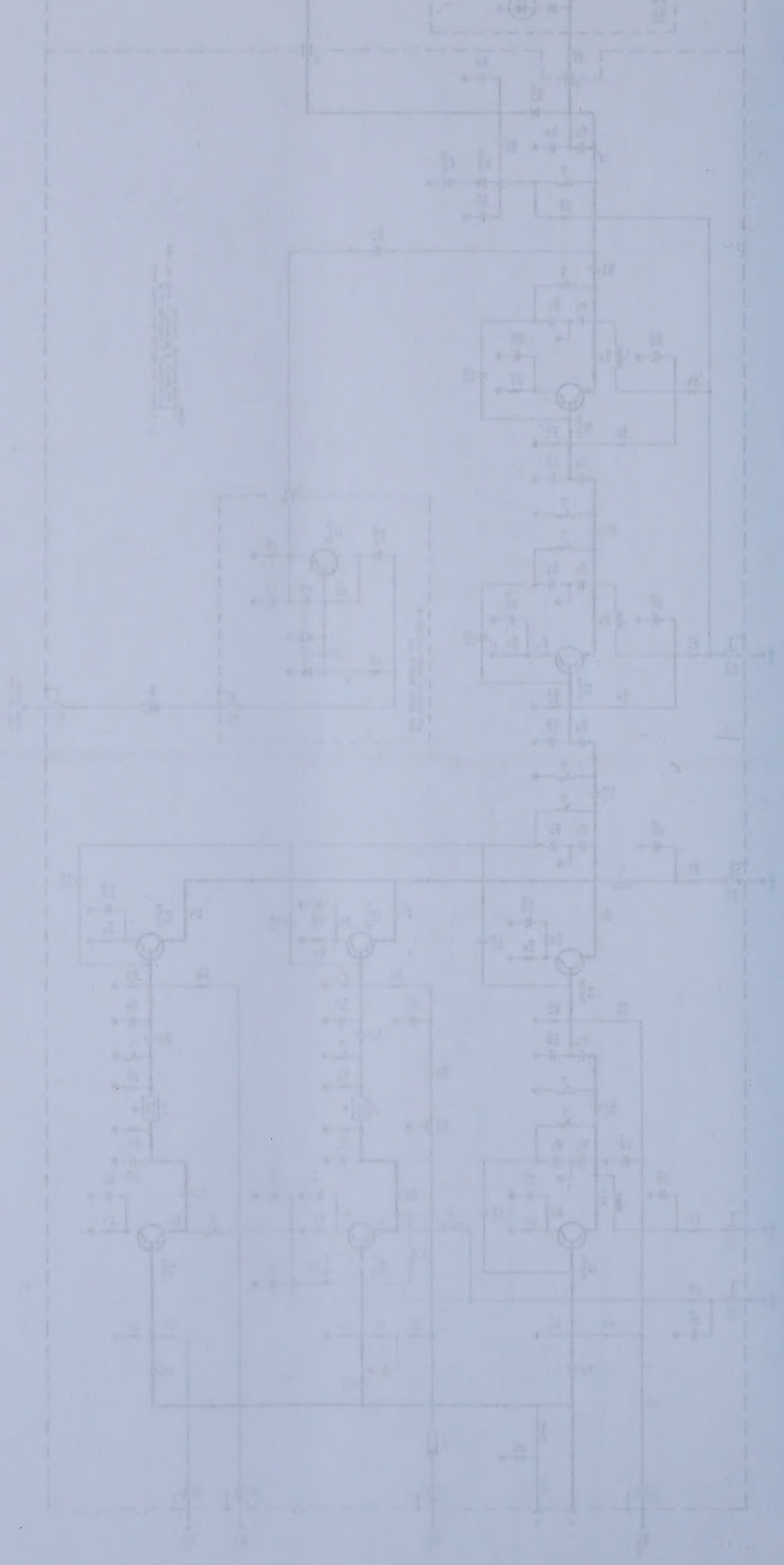

LIMITER/DEMODULATOR PART NO. 10523
REF DESIG PREFIX A1
VIDEO/AGC AMP PART NO. 10527
REF DESIG PREFIX A2
Q3 2N2708
Q1 2N706
Q2 2N706
Q3 2N706
Q4 2N706
Q5 2N2270
Q6 2N2270
Q7 2N2270
Q2 2N2270
Q1 2N2270
Q3 2N2270
Q4 2N2270
CR1 1N198
CR2 1N753A
CR3 1N198
CR4 1N198
CR5 1N198
CR1 1N198
FB2
FB1
E1
R21 470
R12 100
C14 1000
R11 5.6K
C16 24
C17 100
R17 47
R14 12K
R13 5.1K
C32 1000
R16 47
L7
C22 1000
C20 47
C21 47
L8
C23 6.2
R15 470
C18 .0015
C19 68
L9
R20 6.8K
C24 24
C25 68
C1 .005µf
R1 12K
R2 9.1K
R3 1K
L1
R4 5.1K
R5 12K
R6 9.1K
R22 22
C12 1000
C2 1000
R7 47
R8 12K
R9 5.1K
R10 620
L2
R12 12K
R14 22
R13 5.1K
C4 1000
C3 .005µf
C5 1000
C6 15
L3
C7
T1
R16 2.7K
C8 47
C9 47
R15 75K
R17 75K
C10 20
R20 47
R11 100K
R23 18K
C14 1000
R18 4.7M
C11 .005µf
R19 330K
R21 10K
L4
R27 2.7K
R24 100
R26 270
R25 47
C37 1000
C38 1000
C36 1000
C35 1000
+14V
+12V
-6V
-24V
J3 FM VIDEO OUTPUT
AGC
R2 22K
C3 33
R4 33K
R3 1K
C1 4.7µf
R1 100K
R6 10K
C2 1µf
R7 12K
R8 470
R9 51K
R12 100
R10 47
R11 270
L10
J4 AM VIDEO OUTPUT
C29 1000
C33 1000
C27 1000
C28 1000
C34 1000
+12V
+14V
-24V
-6V
GRD
AGC TEST POINT
WIRING TO PLUG (IF USED)
C37 C29
C35 C27
C36 C28
C34 C38
DO NOT USE
R H K P
B E J L N
SPARES
D F M
P1

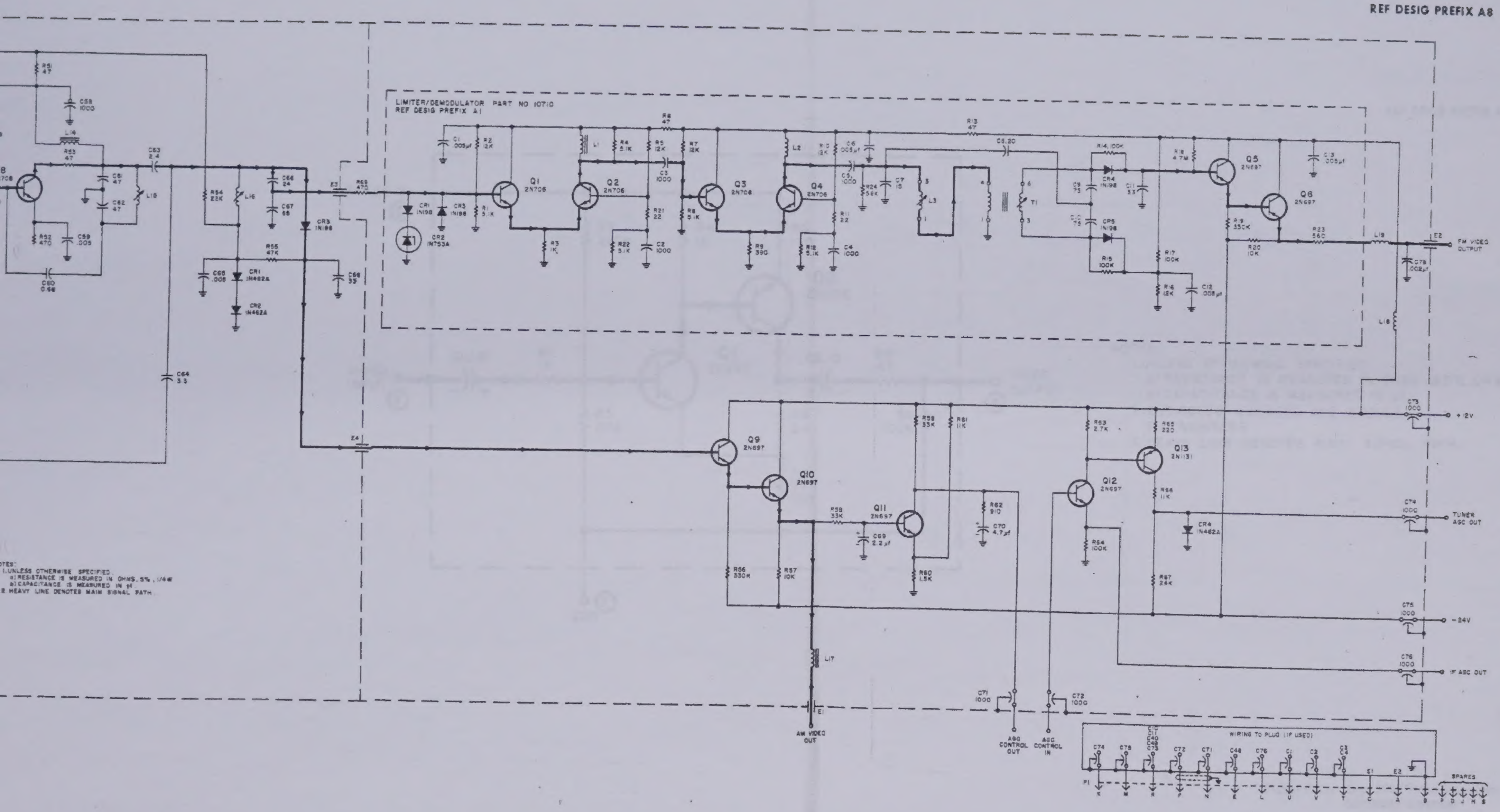
LESS OTHERWISE SPECIFIED
RESISTANCE IS MEASURED IN OHMS ± 5%, 1/4 W
CAPACITANCE IS MEASURED IN pF
EAVY LINE DENOTES MAIN SIGNAL PATH

Figure 6-12. Type 7233 2 MC Bandwidth IF Amplifier, Schematic Diagram


+12V
+12V
+12V
+12V
AGC (300KC)
AGC (75KC)
AGC (20KC)
AGC (20KC)
J1
J2
C1 1000
C2 1000
C3 1000
C4 1000
C5 1000
C7 1000
C8 1000
C9 .005
C10 1000
C11 1000
C12 1000
C13 1000
C14 0.68
C16 200
C17 1000
C19 39
C21 1000
C22 47
C23 47
C24 43
C25 39
C26 1000
C27 0.75
C28 24
C29 360
C31 1000
C32 39
C33 39
C35 1000
C36 0.68
C37 1000
C38 0.68
C39 1000
C40 1000
C41 1000
C42 47
C43 47
C44 0.68
C45 0.75
C46 24
C47 360
C48 1000
C49 1000
C50 1000
C51 .0015
C52 0.68
C53 47
C54 47
C55 1.0
C56 24
C57 360
C58 1000
C59 .005
C60 0.68
C61 47
C62 47
C63 2.4
C64 3.3
C65 .005
C66 24
C67 68
C68 33
C80 47
R1 24
R2 33
R3 24
R4 100
R5 15K
R6 5.1K
R7 100
R8 5K
R9 5.1K
R10 15K
R12 100
R13 100
R14 1K
R15 47
R16 1K
R17 47
R19 47
R20 22
R21 24
R23 8.2K
R24 750
R25 100
R26 5.1K
R27 750
R28 15K
R29 5.1K
R30 15K
R31 5.1K
R32 15K
R33 5.1K
R34 22
R35 1K
R36 22
R37 1K
R38 1K
R39 47
R40 47
R41 47
R42 100
R43 15K
R44 5.1K
R45 470
R46 10
R47 1K
R48 47
R49 12K
R50 5.1K
R51 47
R52 470
R53 47
R54 22K
R55 47K
R69 470
L1
L2
L3
L4
L5
L6
L7
L8
L9
L10
L11
L12
L13
L14
L15
L16
L20
FB1
FB3
FL1 FL-BP 75KC
FL2 FL-BP 20KC
Q1 2N2708
Q2 2N2708
Q3 2N2708
Q4 2N2708
Q5 2N2708
Q6 2N2708
Q7 2N2708
Q8 2N2708
CR1 1N462A
CR2 1N462A
CR3 1N198
E1
E3
E4
BFO MODULE PART NO 1769-3
REF DESIG PREFIX A2
R1 47K
R2 240K
R3 10K
C1 43
C2 1000
C3 68
C4 1000
CR1 1N462A
CR2 1N462A
2.14MC
Q1 2N706
+24V BFO ON
-24V BFO OFF
LIMITE
REF D

NOTES:
1. UNLESS OTHERWISE SPECIFIED:
a) RESISTANCE IS MEASURED IN OHMS, 5%, 1/4W
b) CAPACITANCE IS MEASURED IN pf
2. HEAVY LINE DENOTES MAIN SIGNAL PATH

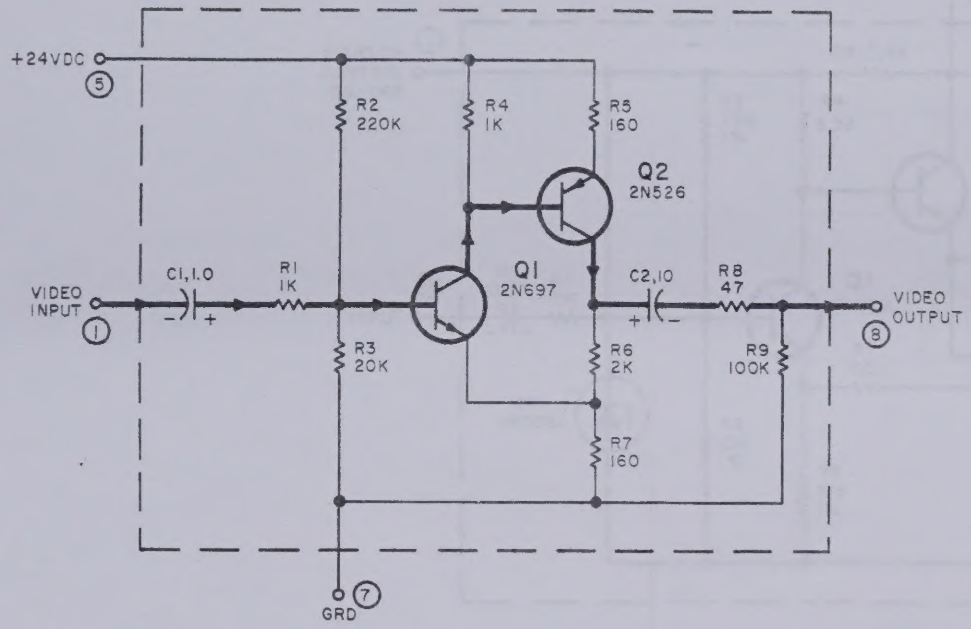



REF DESIG PREFIX A8
LIMITER/DEMODULATOR PART NO 10710
REF DESIG PREFIX A1
R51 47
C58 1000
L14
R53 47
C61 47
C62 47
L15
R52 470
C59 .005
C60 0.68
C63 2.4
C64 3.3
R54 22K
L16
C66 24
C67 68
CR3 1N198
R55 47K
C65 .005
CR1 1N462A
CR2 1N462A
C68 33
E3
R69 470
E4
CR1 1N198
CR3 1N198
CR2 1N753A
C1 .005μf
R2 12K
R1 5.1K
Q1 2N706
Q2 2N706
R3 1K
L1
R4 5.1K
R5 12K
R6 47
C3 1000
R21 22
R22 5.1K
C2 1000
R7 12K
R8 5.1K
Q3 2N706
Q4 2N706
R9 390
L2
R10 12K
C6 .005μf
C5 1000
R24 56K
C7 15
R11 22
R12 5.1K
C4 1000
L3
T1
R13 47
C8 20
R14 100K
CR4 1N198
C9 75
C10 75
CR5 1N198
C11 33
R15 100K
R17 100K
R16 12K
C12 .005μf
R18 4.7M
Q5 2N697
Q6 2N697
C13 .005μf
R19 330K
R20 10K
R23 560
L19
L18
C78 .002μf
E2
FM VIDEO OUTPUT
Q9 2N697
Q10 2N697
R56 330K
R57 10K
R58 33K
C69 2.2μf
Q11 2N697
R59 33K
R61 11K
R60 1.5K
R62 910
C70 4.7μf
L17
E1
AM VIDEO OUT
C71 1000
AGC CONTROL OUT
AGC CONTROL IN
C72 1000
Q12 2N697
R63 2.7K
R64 100K
Q13 2N1131
R65 220
R66 11K
CR4 1N462A
R67 24K
C73 1000
+12V
C74 1000
TUNER AGC OUT
C75 1000
-24V
C76 1000
IF AGC OUT
WIRING TO PLUG (IF USED)
C74
C75
C10 C11 C40 C49 C73
C72
C71
C48
C76
C1
C2
C3 C4
E1
E2
P1
K
M
R
F
N
E
L
U
V
T
C
A
B
SPARES
P
D
J
H
S

OTES:
1.UNLESS OTHERWISE SPECIFIED,
a) RESISTANCE IS MEASURED IN OHMS, 5%, 1/4W
b) CAPACITANCE IS MEASURED IN pf.
HEAVY LINE DENOTES MAIN SIGNAL PATH.

Figure 6-13. Type 7245 20/75/300 KC Bandwidth IF Amplifier, Schematic Diagram

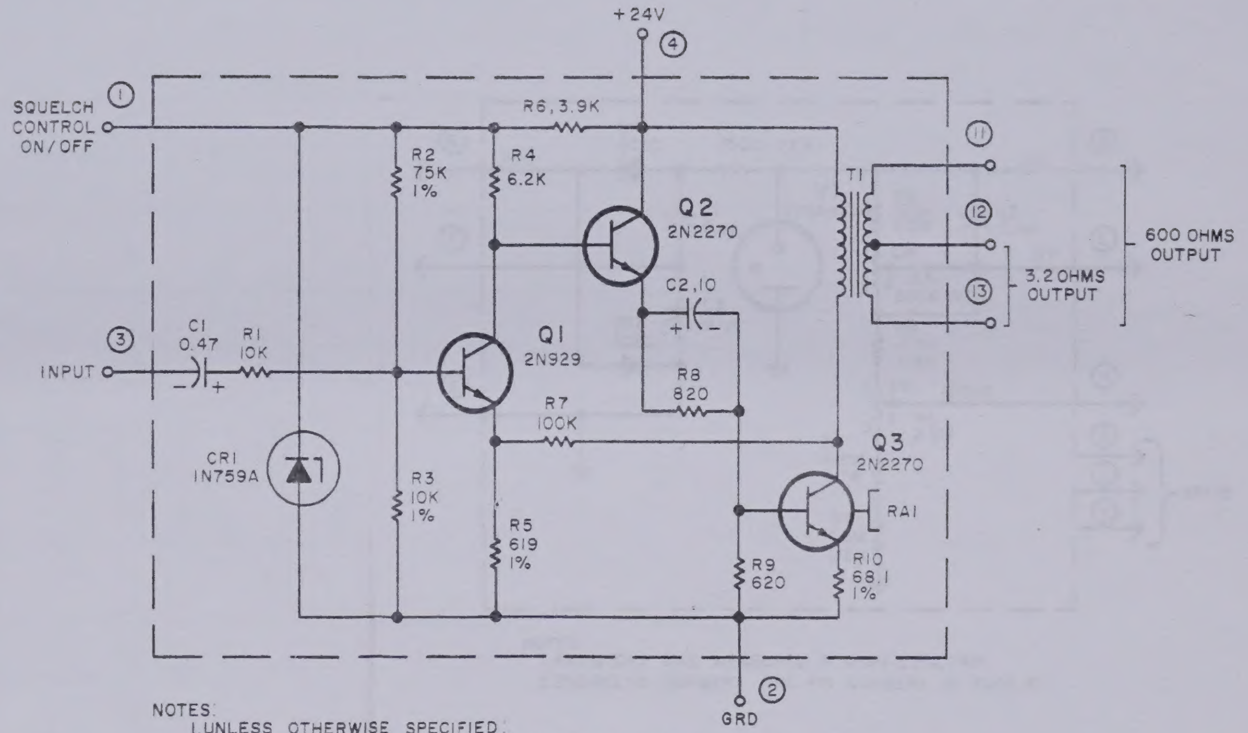
REF DESIG PREFIX A9


+24VDC
⑤
R2
220K
R4
1K
R5
160
Q2
2N526
Q1
2N697
VIDEO
INPUT
①
C1,1.0
R1
1K
C2,10
R8
47
VIDEO
OUTPUT
⑧
R3
20K
R6
2K
R9
100K
R7
160
GRD
⑦

NOTES:
1. UNLESS OTHERWISE SPECIFIED:
   a) RESISTANCE IS MEASURED IN OHMS, ±5%, 1/4W.
   b) CAPACITANCE IS MEASURED IN µf.
2. ENCIRCLED NUMBERS ARE MODULE PIN NUMBERS.
3. HEAVY LINE DENOTES MAIN SIGNAL PATH.

Figure 6-14. Type 7312 Video Amplifier, Schematic Diagram

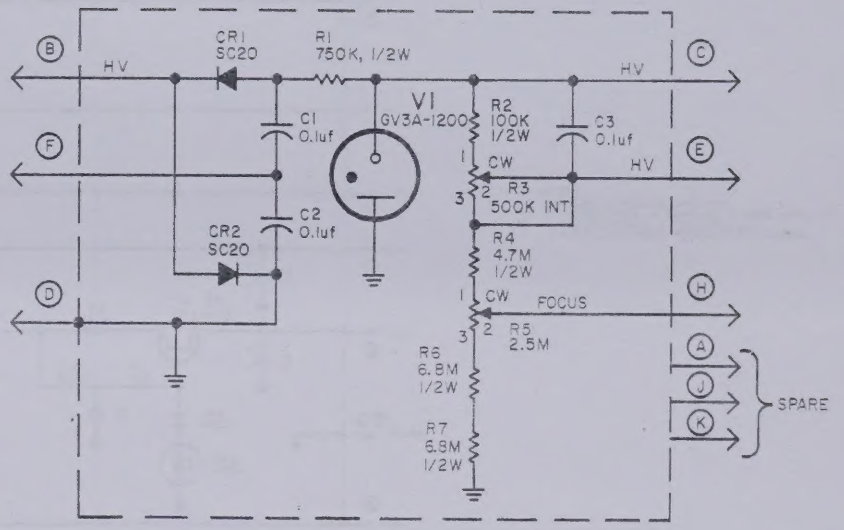
REF DESIG PREFIX A10


+24V
④
①
SQUELCH
CONTROL
ON/OFF
R6, 3.9K
R2
75K
1%
R4
6.2K
T1
⑪
⑫
⑬
600 OHMS
OUTPUT
3.2 OHMS
OUTPUT
Q2
2N2270
C2, 10
③
INPUT
C1
0.47
R1
10K
Q1
2N929
R8
820
R7
100K
CR1
1N759A
Q3
2N2270
RA1
R3
10K
1%
R5
619
1%
R9
620
R10
68.1
1%
②
GRD

NOTES:
1. UNLESS OTHERWISE SPECIFIED:
  a) RESISTANCE IS MEASURED IN OHMS, ± 5%, 1/4W
  b) CAPACITANCE IS MEASURED IN μf
2. ENCIRCLED NUMBERS ARE MODULE PIN NUMBERS

Figure 6-15. Type 7400B Audio Amplifier, Schematic Diagram

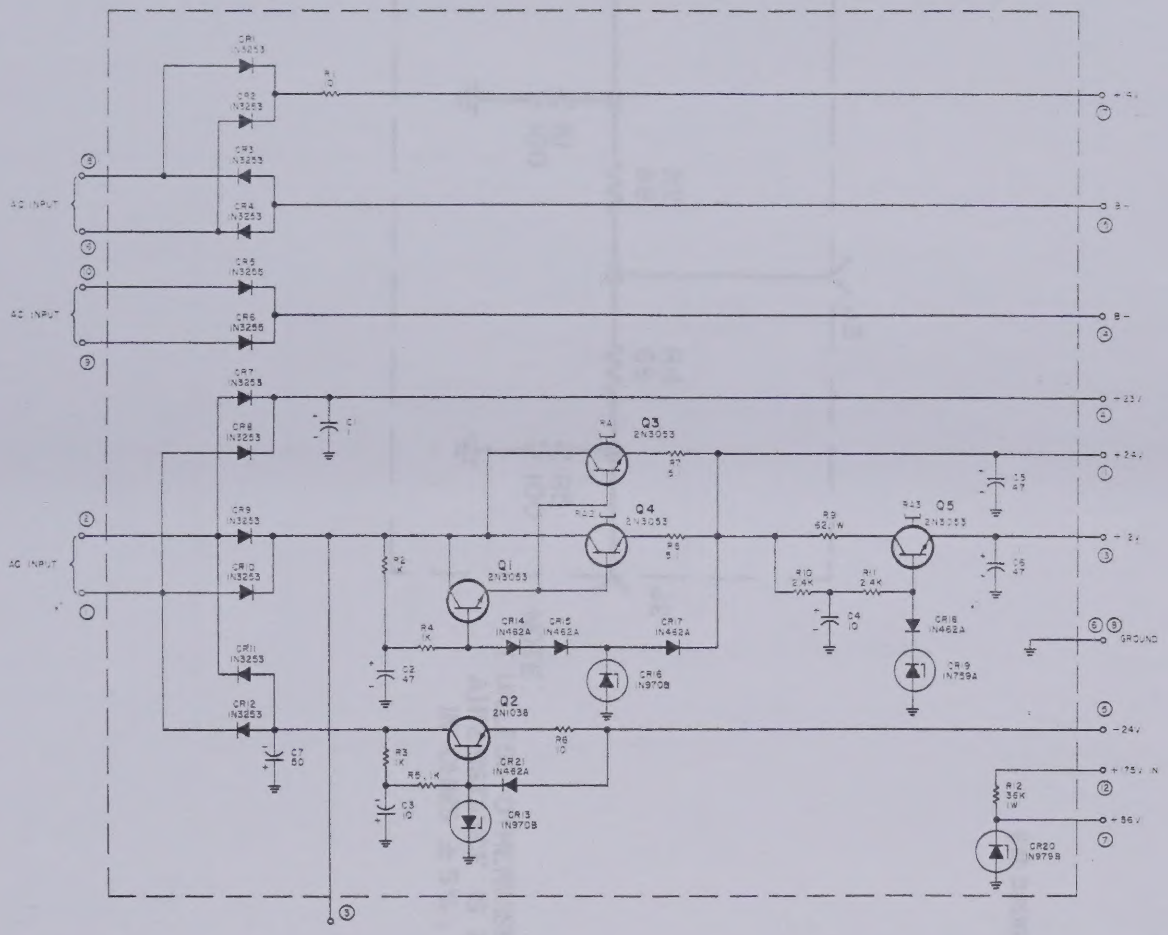
REF DESIG PREFIX A11


B
HV
F
D
CR1
SC20
C1
0.1uf
C2
0.1uf
CR2
SC20
R1
750K, 1/2W
V1
GV3A-1200
R2
100K
1/2W
C3
0.1uf
CW
R3
500K INT
R4
4.7M
1/2W
CW
FOCUS
R5
2.5M
R6
6.8M
1/2W
R7
6.8M
1/2W
1
2
3
HV
C
HV
E
H
A
J
K
SPARE

NOTES:
1. RESISTORS ARE MEASURED IN OHMS ±5%, 1/4W.
2. ENCIRCLED NUMBERS ARE PIN NUMBERS IN PLUG P1.

Figure 6-16. Type 7633 Power Supply Regulator (CRT), Schematic Diagram

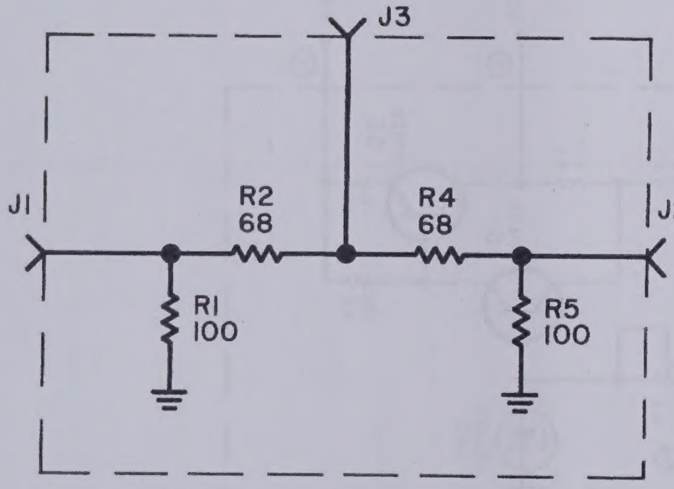
REF DESIG PREFIX A12


CR1
1N3253
CR2
1N3253
CR3
1N3253
CR4
1N3253
CR5
1N3255
CR6
1N3255
CR7
1N3253
CR8
1N3253
CR9
1N3253
CR10
1N3253
CR11
1N3253
CR12
1N3253
AC INPUT
AC INPUT
AC INPUT
⑧
⑤
⑩
⑨
②
R1
10
C1
1
C7
50
③
R2
1K
R4
1K
C2
47
R3
1K
R5, 1K
C3
10
Q1
2N3053
Q2
2N1038
Q3
2N3053
Q4
2N3053
Q5
2N3053
RA
RA2
RA3
R7
5
R8
5
R6
10
CR14
1N462A
CR15
1N462A
CR17
1N462A
CR16
1N970B
CR21
1N462A
CR13
1N970B
R9
62, 1W
R10
2.4K
R11
2.4K
C4
10
CR18
1N462A
CR19
1N759A
C5
47
C6
47
R12
36K
1W
CR20
1N979B
+ 4V
①
B -
④
B -
④
- 23V
④
+ 24V
①
+ 2V
③
⑥ ⑨
GROUND
⑤
- 24V
+ 175V IN
⑫
+ 56V
⑦

NOTES
1. UNLESS OTHERWISE SPECIFIED
a) RESISTANCE IS MEASURED IN OHMS ±5%, 1/4 W
b) CAPACITANCE IS MEASURED IN µf
2. ENCIRCLED NUMBERS ARE MODULE PIN NUMBERS

Figure 6-17. Type 7631A Power Supply Regulator (GEN), Schematic Diagram

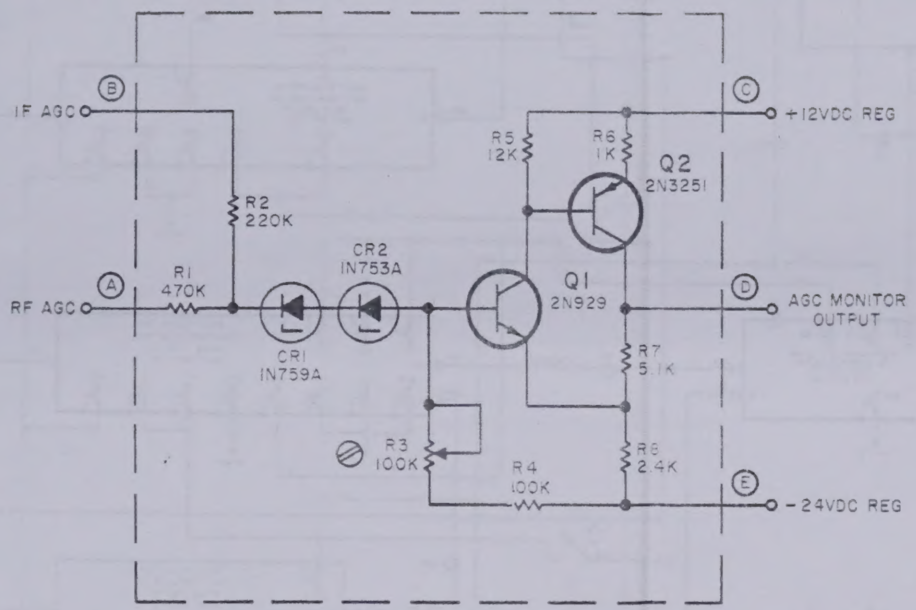
REF DESIG PREFIX A13, A14


J3
J1
J2
R2
68
R4
68
R1
100
R5
100

NOTE:
1. UNLESS OTHERWISE SPECIFIED:
A) RESISTANCE IS MEASURED IN OHMS ±5%, 1/4 W.

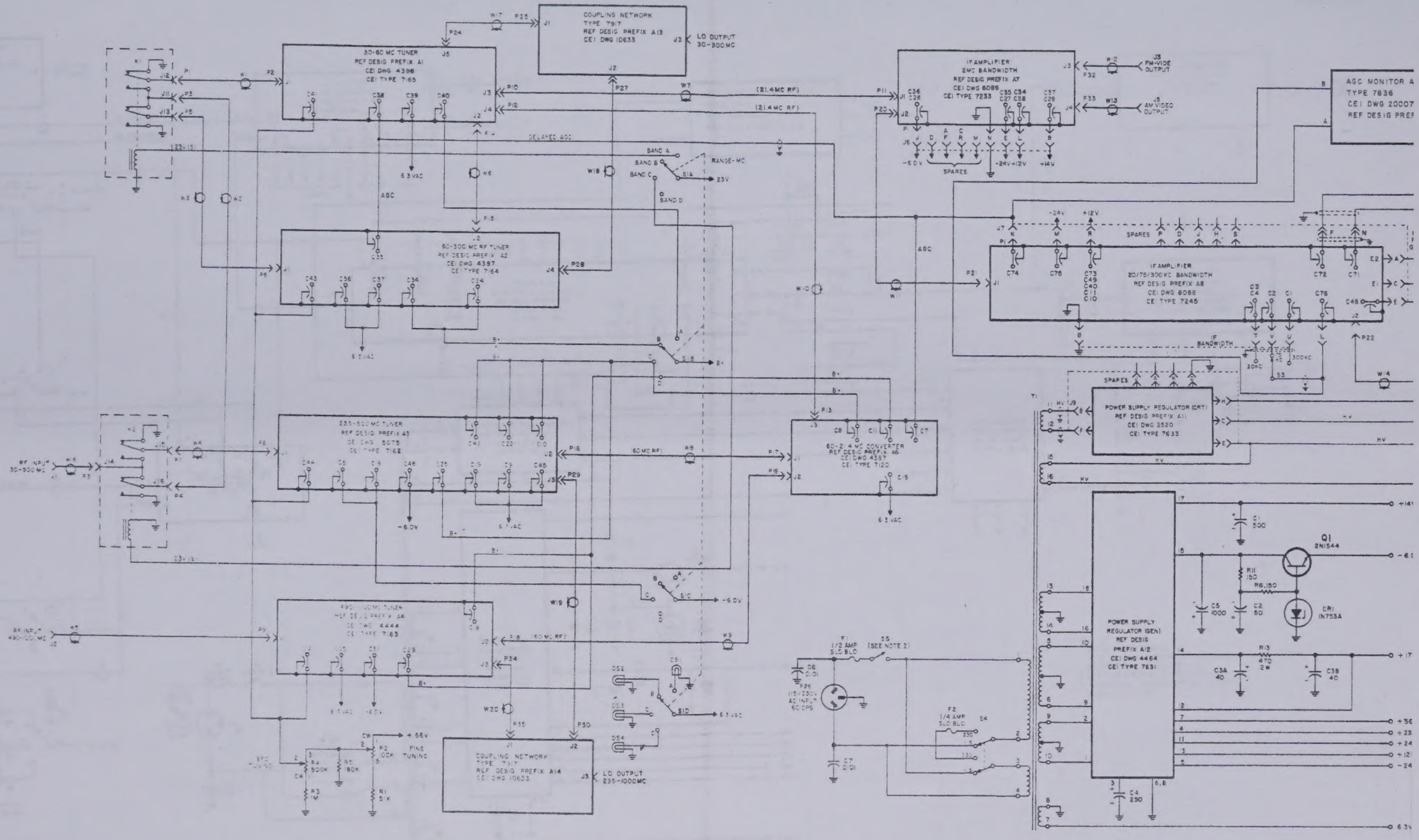
Figure 6-18. Type 7917 Coupling Network, Schematic Diagram

REF DESIG PREFIX A15

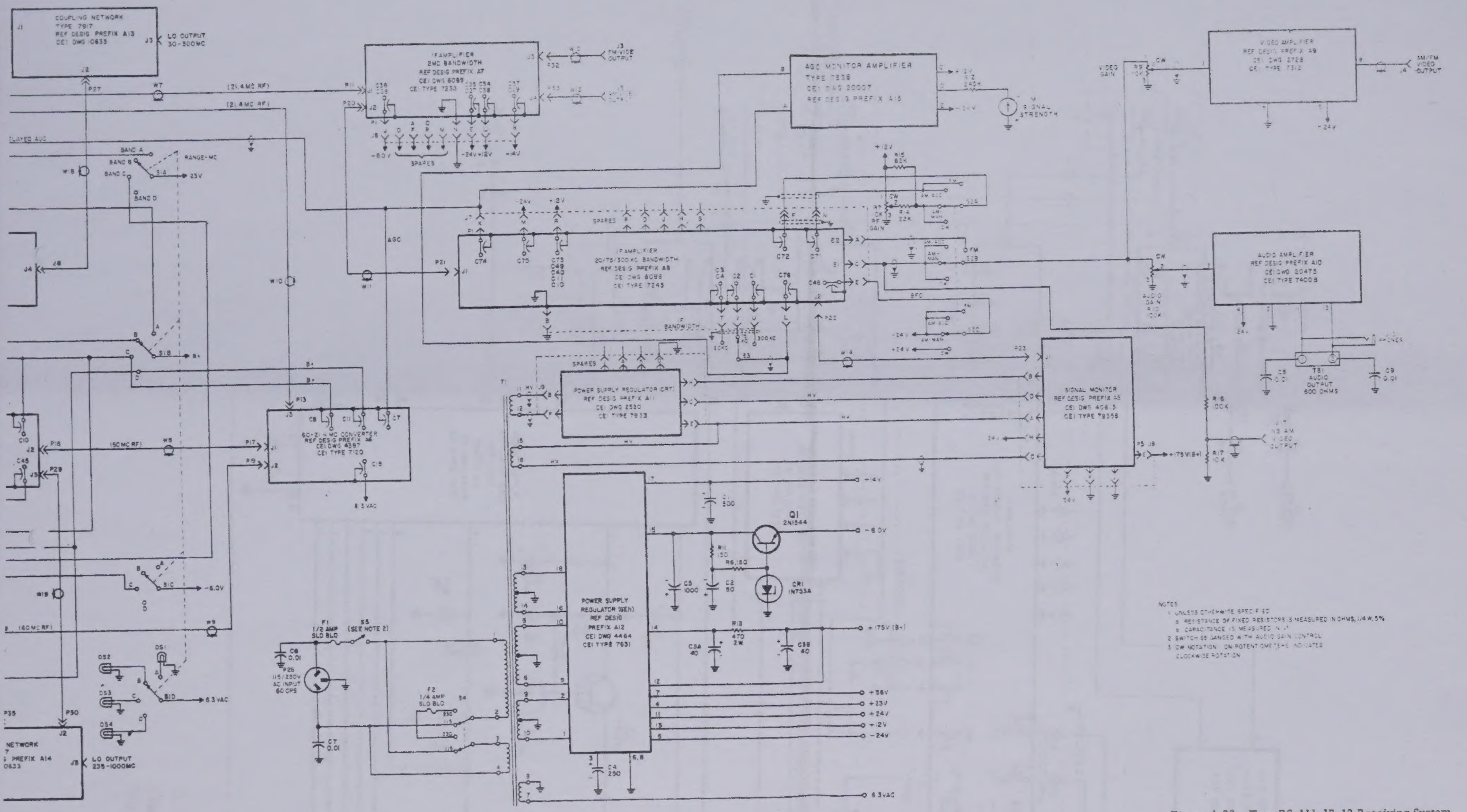

B
IF AGC
A
RF AGC
R1
470K
R2
220K
CR1
IN759A
CR2
IN753A
R3
100K
R4
100K
R5
12K
R6
1K
Q2
2N3251
Q1
2N929
R7
5.1K
R8
2.4K
C
+12VDC REG
D
AGC MONITOR
OUTPUT
E
-24VDC REG

NOTES:
1. RESISTANCE IS MEASURED IN OHMS, ±5%, 1/4W UNLESS OTHERWISE SPECIFIED
2. ENCIRCLED LETTERS ARE FOR REFERENCE ONLY
3. ⊘ INDICATES SCREWDRIVER ADJUSTMENT

Figure 6-19. Type 7836 AGC Monitor Amplifier, Schematic Diagram


30-60 MC TUNER
REF DESIG PREFIX A1
CEI DWG 4398
CEI TYPE 7165
COUPLING NETWORK
TYPE 7917
REF DESIG PREFIX A13
CEI DWG 10633
LO OUTPUT 30-300MC
IF AMPLIFIER
2MC BANDWIDTH
REF DESIG PREFIX A7
CEI DWG 6089
CEI TYPE 7233
J3 FM-VIDEO OUTPUT
J5 AM VIDEO OUTPUT
AGC MONITOR A
TYPE 7836
CEI DWG 20007
REF DESIG PREF
(21.4MC RF)
DELAYED AGC
BAND A
BAND B
BAND C
BAND D
RANGE-MC
S1A
23V
AGC
6.3VAC
60-300 MC RF TUNER
REF DESIG PREFIX A2
CEI DWG 4397
CEI TYPE 7164
IF AMPLIFIER
20/75/300KC BANDWIDTH
REF DESIG PREFIX A8
CEI DWG 6088
CEI TYPE 7245
SPARES
-24V
+12V
-6.0V
+14V
IF BANDWIDTH
20KC
75KC
300KC
S3
S1B
B+
RF INPUT 30-300 MC
235-500MC TUNER
REF DESIG PREFIX A3
CEI DWG 5075
CEI TYPE 7162
(60MC RF)
60-21.4 MC CONVERTER
REF DESIG PREFIX A6
CEI DWG 4387
CEI TYPE 7120
POWER SUPPLY REGULATOR (CRT)
REF DESIG PREFIX A11
CEI DWG 2520
CEI TYPE 7633
HV
23V(S)
S1C
-6.0V
RF INPUT 490-1000MC
490-1000MC TUNER
REF DESIG PREFIX A4
CEI DWG 4444
CEI TYPE 7163
(60 MC RF)
COUPLING NETWORK
TYPE 7917
REF DESIG PREFIX A14
CEI DWG 10633
LO OUTPUT 235-1000MC
AFC TUNING
R4 500K
R5 180K
R2 100K
FINE TUNING
+56V
R3 1M
R1 51K
DS1
DS2
DS3
DS4
S1D
6.3VAC
F1 1/2 AMP SLO BLO
S5 (SEE NOTE 2)
C6 0.01
P26 115/230V AC INPUT 60CPS
C7 0.01
F2 1/4 AMP SLO BLO
S4
230
115
T1
POWER SUPPLY REGULATOR (GEN)
REF DESIG PREFIX A12
CEI DWG 4464
CEI TYPE 7631
C1 500
C5 1000
R11 150
R6,150
C2 50
Q1 2N1544
CR1 1N753A
R13 470 2W
C3A 40
C3B 40
C4 250
+14
-6.0
+17
+56
+25
+24
+12
-24
6.3V

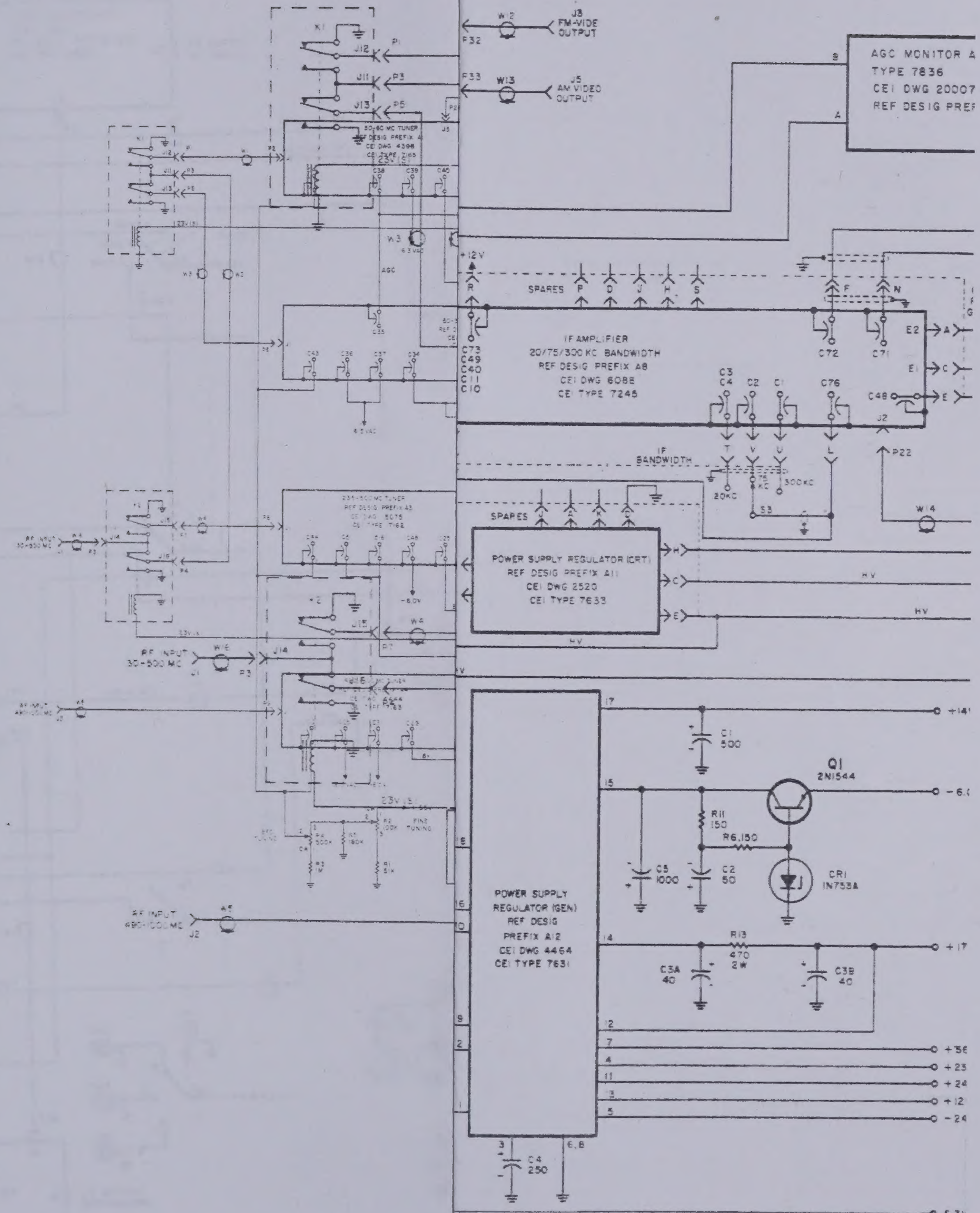
Change
7/17/69


COUPLING NETWORK
TYPE 7917
REF DESIG PREFIX A13
CEI DWG 10633
LO OUTPUT 30-300MC
(21.4MC RF)
BAND A
BAND B
BAND C
BAND D
RANGE-MC
23V
IF AMPLIFIER
2MC BANDWIDTH
REF DESIG PREFIX A7
CEI DWG 6089
CEI TYPE 7233
FM-VIDEO OUTPUT
SPARES
AGC MONITOR AMPLIFIER
TYPE 7838
CEI DWG 20007
REF DESIG PREFIX A15
SIGNAL STRENGTH
VIDEO GAIN
VIDEO AMPLIFIER
REF DESIG PREFIX A9
CEI DWG 2728
CEI TYPE 7312
AM/FM VIDEO OUTPUT
IF AMPLIFIER
20/75/300 KC BANDWIDTH
REF DESIG PREFIX A8
CEI DWG 6088
CEI TYPE 7245
IF BANDWIDTH
RF GAIN
AUDIO AMPLIFIER
REF DESIG PREFIX A10
CEI DWG 20475
CEI TYPE 7400B
AUDIO GAIN
TB1
AUDIO OUTPUT 600 OHMS
60-21.4 MC CONVERTER
REF DESIG PREFIX A6
CEI DWG 4397
CEI TYPE 7120
(60MC RF)
POWER SUPPLY REGULATOR (CRT)
REF DESIG PREFIX A11
CEI DWG 2530
CEI TYPE 7833
SIGNAL MONITOR
REF DESIG PREFIX A5
CEI DWG 4063
CEI TYPE 79368
NB AM VIDEO OUTPUT
POWER SUPPLY
REGULATOR (GEN)
REF DESIG
PREFIX A12
CEI DWG 4464
CEI TYPE 7631
Q1
2N1544
CR1
1N753A
F1
1/2 AMP
SLO BLO
S5
(SEE NOTE 2)
P26
115/230V
AC INPUT
60 CPS
F2
1/4 AMP
SLO BLO
S4
T1
+14V
-8.0V
+175V (B+)
+36V
+23V
+24V
+12V
-24V
6.3VAC
NETWORK
PREFIX A14
LO OUTPUT 235-1000MC

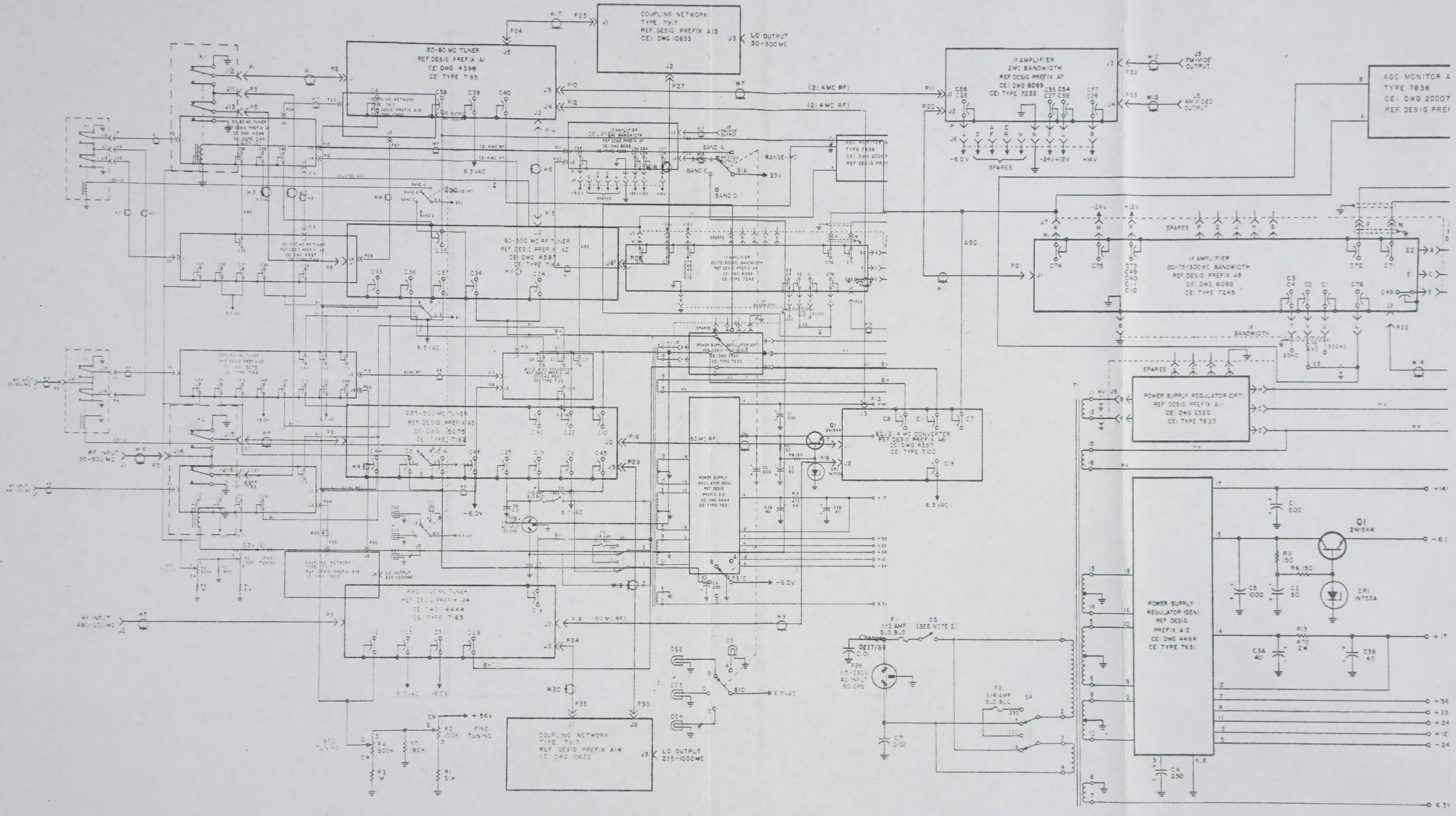
NOTES
1 UNLESS OTHERWISE SPECIFIED
a RESISTANCE OF FIXED RESISTORS IS MEASURED IN OHMS, 1/4 W, 5%
b CAPACITANCE IS MEASURED IN μF
2 SWITCH S5 GANGED WITH AUDIO GAIN CONTROL
3 CW NOTATION ON POTENTIOMETERS INDICATES CLOCKWISE ROTATION

Figure 6-20, Type RS-111-1B-12 Receiving System, Main Chassis, Schematic Diagram

Change 1
7/17/69


J3
FM-VIDEO OUTPUT
J5
AM VIDEO OUTPUT
W12
W13
P32
P33
AGC MONITOR A
TYPE 7836
CEI DWG 20007
REF DESIG PREF
30-60 MC TUNER
REF DESIG PREFIX A
CEI DWG 4398
K1
J12
J11
J13
P1
P3
P5
C38
C39
C40
W3
6.3 VAC
AGC
+12V
SPARES
R
P
D
J
H
S
F
N
IF AMPLIFIER
20/75/300 KC BANDWIDTH
REF DESIG PREFIX A8
CEI DWG 6088
CEI TYPE 7245
C73
C49
C40
C11
C10
C3
C4
C2
C1
C76
C72
C71
E2
E1
C48
J2
P22
A
C
E
IF
BANDWIDTH
T
V
U
L
20KC
75KC
300KC
S3
W14
SPARES
POWER SUPPLY REGULATOR (CRT)
REF DESIG PREFIX A11
CEI DWG 2520
CEI TYPE 7633
H
C
E
HV
HV
HV
-6.0V
J15
W4
P7
RF INPUT
30-500 MC
W16
J14
J1
P3
RF INPUT
490-1000 MC
J2
23V
R2
FINE TUNING
POWER SUPPLY
REGULATOR (GEN)
REF DESIG
PREFIX A12
CEI DWG 4464
CEI TYPE 7631
17
15
14
12
7
4
11
13
5
18
16
10
9
2
1
3
6,8
C1
500
Q1
2N1544
R11
150
R6,150
C5
1000
C2
50
CR1
1N753A
R13
470
2W
C3A
40
C3B
40
C4
250
+14
-6.
+17
+36
+23
+24
+12
-24
6.3V

Change
7/17/69


COUPLING NETWORK TYPE 7917 REF DESIG PREFIX A13 CEI DWG 10633
LO OUTPUT 30-300 MC
30-60 MC TUNER REF DESIG PREFIX A1 CEI DWG 4398 CEI TYPE 7165
(21.4 MC RF)
IF AMPLIFIER 2MC BANDWIDTH REF DESIG PREFIX A7 CEI DWG 6069 CEI TYPE 7233
J3 FM-VIDEO OUTPUT
J5 AM VIDEO OUTPUT
SPARES
AGC MONITOR A TYPE 7836 CEI DWG 20007 REF DESIG PREF
BAND A
BAND B
BAND C
BAND D
RANGE-MC
S1A
23V
6.3 VAC
AGC
60-300 MC RF TUNER REF DESIG PREFIX A2 CEI DWG 4397 CEI TYPE 7164
IF AMPLIFIER 20/75/300 KC BANDWIDTH REF DESIG PREFIX A8 CEI DWG 6088 CEI TYPE 7245
IF BANDWIDTH
20KC
75KC
300KC
POWER SUPPLY REGULATOR (CRT) REF DESIG PREFIX A11 CEI DWG 2520 CEI TYPE 7633
HV
235-500 MC TUNER REF DESIG PREFIX A3 CEI DWG 5075 CEI TYPE 7162
60 MC RF
60/21.4 MC CONVERTER REF DESIG PREFIX A6 CEI DWG 4397 CEI TYPE 7120
Q1 2N1544
CR1 IN753A
POWER SUPPLY REGULATOR (GEN) REF DESIG PREFIX A12 CEI DWG 4464 CEI TYPE 7631
RF INPUT 30-500 MC
RF INPUT 490-1000 MC
490-1000 MC TUNER REF DESIG PREFIX A4 CEI DWG 4444 CEI TYPE 7163
(60 MC RF)
COUPLING NETWORK TYPE 7917 REF DESIG PREFIX A14 CEI DWG 10633
LO OUTPUT 235-1000 MC
BFO TUNING
FINE TUNING
+56V
F1 1/2 AMP SLO BLO
S5 (SEE NOTE 2)
Change 7/17/69
P26 115/230V AC INPUT 60 CPS
F2 1/4 AMP SLO BLO
S4
S1D
6.3 VAC
-6.0V
+14V
+17
+36
+23
+24
+12
-24
6.3V

Change
7/17/69

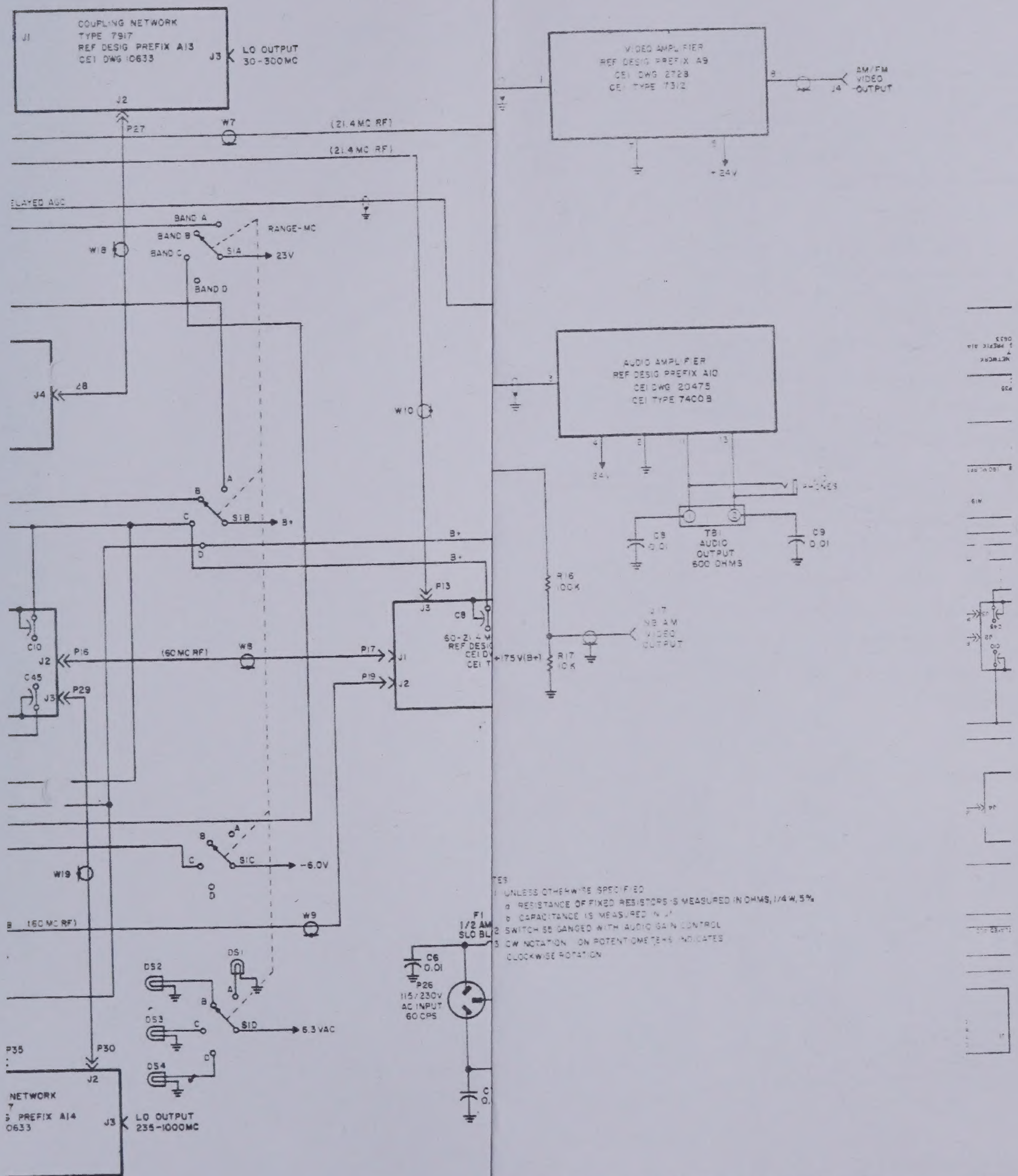
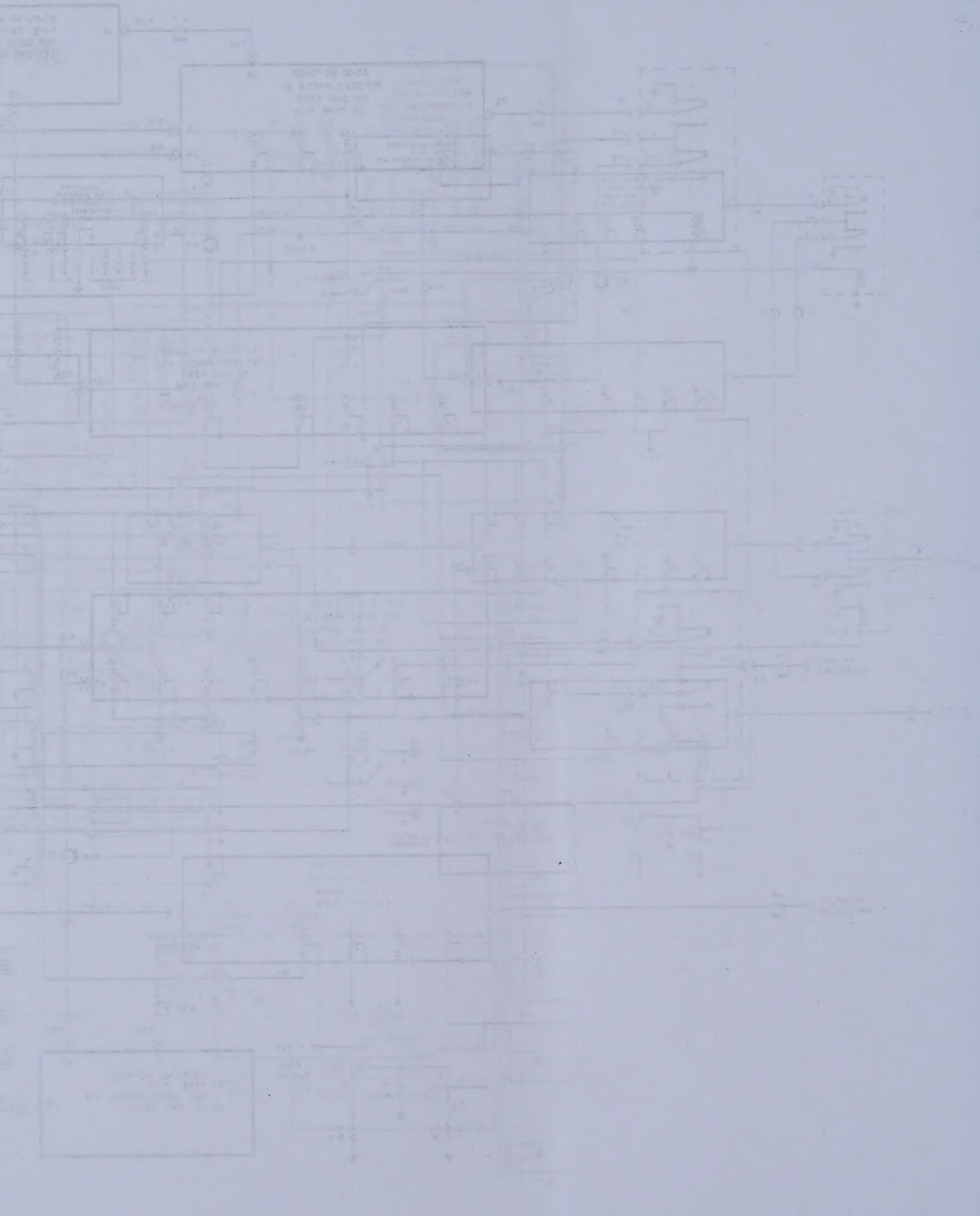
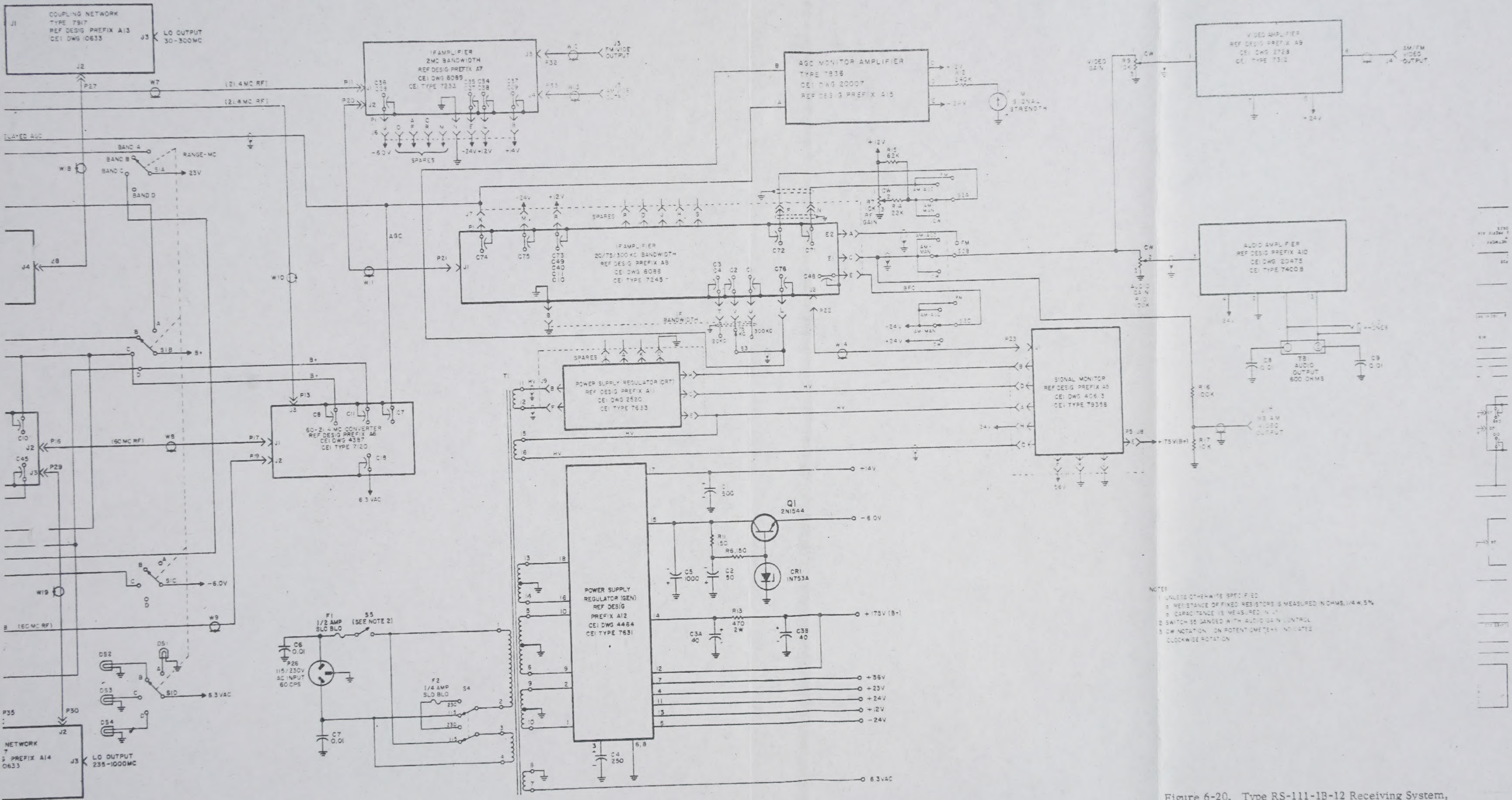

COUPLING NETWORK
TYPE 7917
REF DESIG PREFIX A13
CEI DWG 10633
J1
J3
LO OUTPUT 30-300MC
J2
P27
W7
(21.4MC RF)
(21.4MC RF)
DELAYED AGC
BAND A
BAND B
BAND C
BAND D
RANGE-MC
S1A
23V
W18
J4
28
W10
S1B
B+
B+
B+
P13
J3
C8
60-21.4 MC
REF DESIG
CEI DWG
CEI TYPE
C10
J2
P16
(60MC RF)
W8
P17
J1
P19
J2
C45
J3
P29
+175V(B+)
S1C
-6.0V
W19
(60MC RF)
W9
DS1
DS2
DS3
DS4
S1D
6.3 VAC
F1
1/2 AMP
SLO BLO
C6
0.01
P26
115/230V
AC INPUT
60 CPS
C7
P35
P30
J2
NETWORK
PREFIX A14
10633
J3
LO OUTPUT 235-1000MC
VIDEO AMPLIFIER
REF DESIG PREFIX A9
CEI DWG 2728
CEI TYPE 7312
AM/FM VIDEO OUTPUT
J4
+24V
AUDIO AMPLIFIER
REF DESIG PREFIX A10
CEI DWG 20475
CEI TYPE 7400 B
24V
PHONES
C8
0.01
TB1
AUDIO OUTPUT
600 OHMS
C9
0.01
R16
100K
J17
NB AM
VIDEO
OUTPUT
R17
10K
NOTES
1 UNLESS OTHERWISE SPECIFIED
a RESISTANCE OF FIXED RESISTORS IS MEASURED IN OHMS, 1/4 W, 5%
b CAPACITANCE IS MEASURED IN UF
2 SWITCH S5 GANGED WITH AUDIO GAIN CONTROL
3 CW NOTATION ON POTENTIOMETERS INDICATES CLOCKWISE ROTATION

Figure 6-20. Type RS-111-1B-12 Receiving System, Main Chassis, Schematic Diagram




COUPLING NETWORK
TYPE 7917
REF DESIG PREFIX A13
CEI DWG 10633
LO OUTPUT
30-300MC
IF AMPLIFIER
2MC BANDWIDTH
REF DESIG PREFIX A7
CEI DWG 6089
CEI TYPE 7233
FM VIDEO OUTPUT
AGC MONITOR AMPLIFIER
TYPE 7836
CEI DWG 20007
REF DESIG PREFIX A15
SIGNAL STRENGTH
VIDEO AMPLIFIER
REF DESIG PREFIX A9
CEI DWG 2728
CEI TYPE 7312
AM/FM VIDEO OUTPUT
VIDEO GAIN
(21.4MC RF)
BAND A
BAND B
BAND C
BAND D
RANGE-MC
23V
SPARES
-6.0V
-24V
+12V
+4V
AGC
IF AMPLIFIER
20/75/300KC BANDWIDTH
REF DESIG PREFIX A8
CEI DWG 6088
CEI TYPE 7243
RF GAIN
BFO
IF BANDWIDTH
20KC
75KC
300KC
AUDIO AMPLIFIER
REF DESIG PREFIX A10
CEI DWG 20475
CEI TYPE 7400B
AUDIO GAIN
AUDIO OUTPUT
600 OHMS
PHONES
B+
60-21.4MC CONVERTER
REF DESIG PREFIX A6
CEI DWG 4387
CEI TYPE 7120
(60MC RF)
6.3VAC
POWER SUPPLY REGULATOR (CRT)
REF DESIG PREFIX A11
CEI DWG 2520
CEI TYPE 7633
HV
SIGNAL MONITOR
REF DESIG PREFIX A5
CEI DWG 4063
CEI TYPE 7935B
21.4M VIDEO OUTPUT
+175V(B+)
+14V
Q1
2N1544
-6.0V
CR1
1N753A
POWER SUPPLY
REGULATOR (GEN)
REF DESIG
PREFIX A12
CEI DWG 4484
CEI TYPE 7631
+175V (B+)
+36V
+23V
+24V
+12V
-24V
6.3VAC
F1
1/2 AMP
SLO BLO
S5
(SEE NOTE 2)
P26
115/230V
AC INPUT
60CPS
F2
1/4 AMP
SLO BLO
S4
NETWORK
PREFIX A14
10633
LO OUTPUT
235-1000MC

NOTES
1 UNLESS OTHERWISE SPECIFIED
a RESISTANCE OF FIXED RESISTORS IS MEASURED IN OHMS, 1/4 W, 5%
b CAPACITANCE IS MEASURED IN µF
2 SWITCH S5 GANGED WITH AUDIO GAIN CONTROL
3 CW NOTATION ON POTENTIOMETERS INDICATES CLOCKWISE ROTATION

Figure 6-20. Type RS-111-1B-12 Receiving System, Main Chassis, Schematic Diagram